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Towards a better understanding of the antecedents, generalizability, and measurement of psychological need satisfaction and frustration

Jolene van der Kaap-Deeder

Promotor: Prof. Dr. Maarten Vansteenkiste

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CHAPTER 1

Towards a Better Understanding of the Antecedents, Generalizability, and Measurement of Psychological Need Satisfaction and Frustration: A General Introduction

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Introduction

When individuals would be asked what they *need* in life to function well, different individuals would likely provide very different answers. Some individuals might say that they need food and water, others would tell you they need to build up satisfying family relations and friendships, and still others may want more luxurious goods, status and fame to function optimally. Within the empirical tradition of psychology, the concept of needs has had a long history (Deci & Ryan, 2000). That is, the drive theory suggested that individuals have certain innate, physiological needs (e.g., need for food and water) that drive their actions (Hull, 1943) and that constitute fundamental requirements to function well. Murray (1938), in contrast, focused on psychological (e.g., need for power or dominance) rather than physiological needs, argued that these needs are acquired and suggested that while the pursuit of some needs may be conducive to some individuals' psychological functioning, other individuals may focus and benefit from other needs (Deci & Ryan, 2000). A more recent approach to the study of psychological needs can be found in the Self-Determination Theory (SDT; Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013; Vansteenkiste & Soenens, 2015), perhaps the contemporary empirical framework in the psychological landscape that takes the strongest position regarding this topic. Based on extensive research, the psychological needs for autonomy, competence, and relatedness were postulated as critical nutrients for individuals' sustainable motivation, growth, and well-being and this would hold true regardless of individuals' age, cultural background, and socio-economic backgrounds. This theory and the notion of psychological needs constitutes the core of this dissertation.

Although the topic of psychological needs as proposed within SDT has received massive attention in the literature, several lacunae remain that deserve attention. Based on the identification of these lacunae in the extant research, we formulated five broader aims that were addressed in a cumulative series of 14 studies, compromising more than 1500 participants. First, we aimed to examine whether the beneficial or detrimental effects of, respectively, need satisfaction or need frustration would generalize to autonomy-restrictive contexts and to individuals differing in their degree of need

strength (i.e., the personal importance of or the desire for one of the needs). Second, given the importance of integration (i.e., the process through which people accept past and present experiences and harmonize these experiences within their sense of self) for individuals' well-being (Weinstein, Przybylski, & Ryan, 2013), we investigated how need-satisfying and need-frustrating experiences get integrated and addressed the role of personal characteristics (i.e., self-congruence, evaluative concerns perfectionism, and depressive symptoms) herein. Third, as most research on the psychological needs as proposed within SDT employed explicit measures (e.g., Chen, Vansteenkiste, et al., 2015), we aimed to develop and validate an implicit measure of competence satisfaction. As for our fourth aim, the focus shifted to the role of the social context as a facilitator of need satisfaction, thereby paying particular attention to the role of contextual autonomy support (Reeve, 2009; Soenens, Deci, & Vansteenkiste, in press). In doing so, both the role of socializing agents in a more vertical relationship (e.g., parent-child; therapist-client) as well as individuals in a horizontal relationship to the target (e.g., siblings; patients) were considered. Finally, as for the fifth and final aim, we explored whether experiences of need satisfaction would enable individuals to adopt a more autonomy-supportive approach vis-à-vis others, while experiences of need frustration would relate to the exertion of greater control in relation to others.

This general introductory chapter starts with a theoretical introduction and a review of past research in relation to the notion of basic psychological needs, the central concept of this dissertation. A number of conceptual and methodological gaps in the current literature are subsequently identified, which provide the impetus for the conducted studies within this dissertation. At the end of the introduction, we provide an outline of the specific research objectives that were pursued through the different empirical chapters.

1. Basic Psychological Need Satisfaction and Frustration: State-of-the-Art

1.1. The Core of Self-Determination Theory: Basic Psychological Needs

One of the mini-theories of SDT, a broad theory on human motivation and socialization (Deci & Ryan, 2000; Vansteenkiste, Niemiec, & Soenens, 2010), is the Basic Psychological Need Theory (BPNT). Central within BPNT are the psychological needs for autonomy, competence, and relatedness. The need for *autonomy* refers to the experience of volition, choice and self-endorsement. Satisfaction of this need is apparent when individuals experience a sense of ownership concerning their daily activities. *Competence* signifies the experience of skillfulness and a sense of control over desired outcomes. The need for competence is satisfied when individuals feel effective when dealing with a challenging situation. *Relatedness* entails the feeling of being connected to other people and of having loving and trustworthy relationships. Individuals who experience a sense of closeness and understanding from important others experience relatedness satisfaction. With respect to the need for autonomy, it is important to note that within SDT autonomy is regarded to be distinct from independence. That is, whereas autonomy reflects the degree of experienced volition versus pressure, independence refers to the degree of interpersonal distance in relationships (Van Petegem, Vansteenkiste, & Beyers, 2013).

Whereas psychological need satisfaction is experienced when individuals' needs are met, need frustration refers to the active thwarting of individuals' needs (Vansteenkiste & Ryan, 2013). With respect to autonomy, frustration is evident when individuals feel pressured into doing certain activities against their will. Competence frustration is present when individuals feel like a failure because they are overwhelmed by a non-controllable situation. Finally, relatedness frustration is indicated by feelings of distance and rejection concerning social relationships.

Within SDT, these needs meet several criteria (Deci & Ryan, 2000; Vansteenkiste et al., 2010). First, these needs are *psychological*. That is, in addition to having physical needs (e.g., the need for food and water), SDT states that humans also have a limited set of core psychological needs. Second,

these psychological needs are postulated to be necessary requirements for individuals' optimal psychological functioning. That is, although individuals are stated to be naturally oriented toward growth, the satisfaction of each of these needs is assumed to be *essential* for supporting this growth tendency. Third, these psychological needs are said to be *inherent* rather than acquired. Specifically, because of their evolutionary advantages, these needs have become part of individuals' psychological make-up from birth, thus being operative throughout the lifespan. Fourth, related to its inherent character, the satisfaction of these needs is considered *universally critical* for individuals' well-being, motivation, and integration. Thus, regardless of people's gender, age, socio-economic and cultural background, everyone is assumed to benefit from the satisfaction of these needs and to suffer from the very frustration of these needs, although there might exist some variability in the way these needs get nurtured and thwarted (Soenens, Vansteenkiste, & Van Petegem, 2015).

1.2. Correlates of Need Satisfaction and Need Frustration

A vast amount of studies have indeed shown that the satisfaction of the psychological needs yields diverse benefits, while the frustration of these needs relates to a variety of adverse outcomes (see Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). That is, whereas the satisfaction of the psychological needs has been found to play a primary explanatory role in the 'bright' side of human psychological functioning (e.g., being conducive to individuals' well-being), the frustration of the needs has been shown to be fundamental for explaining the 'dark' side of this functioning (e.g., ill-being and psychopathology) (Vansteenkiste & Ryan, 2013). For example, need satisfaction has been found to relate to vitality and positive affect (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011), and to autonomous motivation (Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015), whereas need frustration related to disordered eating, burnout, and depressive symptoms (Bartholomew et al., 2011).

The beneficial effects of need satisfaction have not only been observed at the general level, but also at the domain-level (e.g., work, school, and sports) (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). To illustrate, adolescents who experienced need satisfaction at school, at home, and with friends, displayed higher well-being and better school adjustment (Milyavskaya et al., 2009). Also, within the clinical context, Dwyer, Hornsey, Smith, Oei, and Dingle (2011) found, in a group of depressed and anxious patients, that autonomy need satisfaction during residential therapy predicted decreases in anxious and depressive cognitions.

1.3. Identifying Gaps in the Literature

First, although need satisfaction and need frustration might, at first sight, seem to represent the two end-points of a singly continuum, recent research (e.g., Bartholomew et al., 2011) and theorizing (Vansteenkiste & Ryan, 2013) indicates that these are in fact fairly distinct processes. That is, the mere absence of need satisfaction does not necessarily involve the presence of need frustration. To illustrate, individuals who do not feel very connected to their fellow students (i.e., low relatedness satisfaction) do not necessarily feel excluded and rejected by them (i.e., relatedness frustration). Conversely, the absence of need frustration does not imply the presence of need satisfaction as the promotion of growth requires more than the mere absence of a deficiency. Although research has begun to differentiate between need satisfaction and need frustration (e.g., Bartholomew et al., 2011; Chen, Vansteenkiste, et al., 2015; Haerens et al., 2015), the question whether these two constructs are indeed differentially related to outcomes and antecedents has remained relatively understudied. We addressed this issue in **Chapter 4** and **Chapter 8** by examining the differential role of need satisfaction and need frustration in predicting well-being and ill-being and in **Chapter 10** by investigating the differential predictive role of daily need satisfaction and daily need frustration among parents as predictors of child-perceived autonomy support and psychological control.

Second, while a vast amount of studies have focused on the outcomes of the psychological needs (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013), these mainly employed adolescent or adult samples. A few studies, however, have also shown need satisfaction to be important among children as it related positively to well-being and to positive affect (e.g., Véronneau, Koestner, & Abela, 2005). To contribute to this underexplored issue, we examined in **Chapter 8** and **Chapter 9** the outcomes of the psychological needs in a sample of elementary school children.

Third, most research has focused on the effects of the psychological needs at the between-person level (e.g., Ng, Lonsdale, & Hodge, 2011). There are, however, also important daily variations in experienced need satisfaction (e.g., Ryan, Bernstein, & Brown, 2010) and need frustration (Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013) relating to daily fluctuations in outcomes. These results suggest that need satisfaction and frustration constitute dynamic and malleable experiences susceptible to changes in the social environment (Brown & Ryan, 2006). We aimed to contribute to this line of work in **Chapter 8** and **Chapter 10** by examining the covariates of daily levels of both need satisfaction and frustration in children (Chapter 8) as well as parents and their children (Chapter 10).

2. The Generalizability of the Effects of Psychological Need Satisfaction and Need Frustration

As noted previously, SDT's universality claim states that all individuals should benefit from need satisfaction and suffer from need frustration, as these psychological needs are seen as inherent and essential for individuals' well-being and psychological growth (Deci & Ryan, 2000). This claim has been investigated and corroborated by examining the role of sociodemographic (e.g., age, and gender), cultural, psychological (e.g., need strength), and contextual (e.g., need-restrictive contexts) characteristics in the relation between the needs and outcomes.

2.1. The Role of Sociodemographic and Cultural Characteristics

With respect to the role of age and gender, studies have found positive or negative effects of, respectively, need satisfaction or frustration among both younger (e.g., elementary school children; Véronneau et al., 2005) and older (nursing home residents; Ferrand, Martinent, & Durmaz, 2014) individuals as well as among women and men (e.g., Vanhee, Lemmens, & Verhofstadt, 2016). Additionally, although some studies did find significant moderating effects of age and gender in the relation between the needs and psychological functioning (e.g., Weman-Josefsson, Lindwall, & Ivarsson, 2015), such effects were, in general, moderate in size and have not been reported systematically across studies.

With respect to the cultural characteristics, a multitude of studies have found the effects of need satisfaction and frustration to be present in and similar across diverse cultures, thereby validating SDT's universality claim (e.g., Chen, Vansteenkiste, et al., 2015; Tay & Diener, 2011; Taylor & Lonsdale, 2010). For example, Chen, Vansteenkiste, et al. (2015) showed that need satisfaction related to well-being (e.g., life satisfaction) and need-frustration to ill-being (i.e., depressive symptoms) in an equivalent way in four culturally diverse countries (i.e., Belgium, China, USA, and Peru). Similarly, Church et al. (2013) found that need satisfaction predicted overall well-being to a similar degree across eight diverse cultures (i.e., the United States, Australia, Mexico, Venezuela, the Philippines, Malaysia, China, and Japan).

It is important to note that although studies in general have not found a significant and consistent moderating role of age, gender, and culture in the relation between the satisfaction or frustration of the needs and outcomes, individuals can differ in their average level of need satisfaction or frustration and in the means by which their needs are generally met (see also Soenens et al., 2015). For example, older individuals have been found to experience higher levels of autonomy while voting, tipping, and paying taxes compared to younger individuals (Sheldon, Kasser, Houser-Marko, Jones, & Turban, 2005) and parents' use of guilt-induction constitutes a more need-thwarting parental practice

among Chinese, relative to Belgian, adolescents (Chen, Soenens, Vansteenkiste, Van Petegem, & Beyers, 2016).

2.2. The Role of Psychological Characteristics

Another line of studies focused on the moderating role of personal characteristics in the relation between need satisfaction or need frustration and psychological functioning. For instance, Mabbe, Soenens, Vansteenkiste, and Van Leeuwen (2016) found that the relation between need frustration and internalizing or externalizing problems was unmoderated by individuals' personality characteristics (i.e., emotional stability, extraversion, openness to experience, agreeableness, and conscientiousness). Additionally, several studies have focused on the moderating role of more proximal variables, that is, variables that are more directly tied to the needs themselves, including people's need strength. Need strength has been characterized by the desire for (i.e., need desire) or the valuation attached to (i.e., need valuation) a certain need (e.g., Chen, Vansteenkiste, et al., 2015; Vallerand, 2000). According to a dispositional motive approach it is assumed that especially individuals with a strong *need for* need satisfaction, will benefit and suffer from experiences of, respectively, need satisfaction and need frustration (Schultheiss, 2008). To illustrate, (only) individuals with a strong, relative to those with a weak, need to be successful and to achieve would experience a higher level of well-being when succeeding in a challenging task (i.e., competence satisfaction). In contrast, from a SDT viewpoint these effects of the needs should be largely universal and similar across individuals (independent of their level of need strength). If any moderation would occur by need strength, the effects may be weakened yet not cancelled out by interpersonal differences in need strength.

Evidence concerning the moderating role of need strength in the relation between the needs and psychological functioning is mixed. For example, Schüler, Sheldon, and Fröhlich (2010) showed that implicitly assessed need for achievement (i.e., an acquired preference for competence-satisfying experiences) moderated the relation between competence satisfaction and a range of domain-specific

positive outcomes (e.g., flow). The explicit measure of need for achievement, however, did not serve as a significant moderator. Further, Sheldon and Schüler (2011) found that both implicit and explicit need strength with respect to the needs for achievement and affiliation failed to moderate the observed positive relation between, respectively, competence and relatedness satisfaction and global well-being. Finally, Chen, Vansteenkiste, et al. (2015) found that need strength, operationalized as both need valuation and need desire, failed to moderate the relation between both need satisfaction or frustration and outcomes in two large samples of university students.

2.3. The Role of Contextual Characteristics

Besides the role of sociodemographic, cultural and personal characteristics, a few studies also addressed the role of contextual characteristics in the relation between the needs and psychological functioning. In this respect, Chen, Van Assche, Vansteenkiste, Soenens, and Beyers (2015) examined whether environmental safety, which reflects the extent to which individuals perceive their environment to be stable, predictable and protected from physical threats (Maslow, 1954), as experienced by young adults in South Africa moderated the relation between need satisfaction and well-being. Extrapolating on Maslow's framework, they reasoned that the role of psychological needs may possibly be weakened in case individuals perceive their environment to be less safe, as the latter reflects a lower-order need in the need hierarchy. Yet, they found that individuals benefitted from psychological need satisfaction, regardless of their sense of perceived environmental safety (Chen, Van Assche, et al., 2015).

Other studies focused on the following question: Do individuals within need-restrictive contexts benefit from need-satisfying experiences? Speculations concerning the answer to this question could go two ways. First, based on a *contrast-view*, we might expect that need-satisfying experiences are especially beneficial for individuals who find themselves in a need-restrictive environment as the benefits of need-nurturing social figures and need-satisfying activities would be more salient, that is,

"stand out" in comparison to contrasting need-thwarting environments. To illustrate, prisoners who generally feel restricted in their autonomy might benefit more from afforded choice with respect to their daily activity than individuals outside the prison who are used to having choice over their daily schedule. Although this hypothesized reasoning has not been addressed directly, a study from Langer and Rodin (1976) is informative. These authors showed experimentally that afforded choice in an autonomy-restrictive context, namely among nursing home residents, related to higher levels of happiness, alertness, and active participation compared to residents who were not provided with choices. Note, however, that this finding shows that individuals in a need-restrictive environment also profit from need satisfaction, but not that they profit *more* than individuals in a non-need-restrictive context.

On the other hand, one could speculate that residing in a need-restrictive environment might detach individuals from their basic psychological needs so that they no longer (or to a lesser extent) value and profit from need-satisfying experiences. In other words, need frustration could, in the long run, engender a process of desensitization with regard to one's psychological needs (Moller, Deci, & Elliot, 2010; Vansteenkiste et al., 2010). In contrast, in case individuals would experience more endurable need satisfaction, they may be more sensitive for a new opportunity of need satisfaction, possibly extracting greater benefits from it. In line with this idea, Howell, Chenot, Hill, and Howell (2011) reported that when the needs for autonomy and relatedness were met (as assessed by hour-by-hour ratings), individuals with high levels of life satisfaction experienced greater increases in momentary happiness than individuals with low levels of life satisfaction. Thus, from the notion of (de)sensitization, individuals within need-restrictive environments may benefit less from need-satisfying experiences.

2.4. Identifying Gaps in the Literature

At least two gaps can be identified in the literature on the generalizability of need-based experiences that deserve greater attention. First, studies that directly addressed the possible moderating role of need strength are scarce and have found inconsistent results. This could be due to the diversity in the conceptualization (dependent on the underlying theoretical framework) and assessment (i.e., implicit verses explicit measure) of need strength. Moreover, only two such studies focused on the need for autonomy (Chen, Vansteenkiste, et al., 2015; Schüler, Sheldon, Prentice, & Halusic, 2016). Therefore, more research is needed to clarify the generalizability of the effects of autonomy satisfaction or frustration to individuals differing in their level of autonomy strength. This issue was addressed in **Chapter 4**.

Second, research concerning the effects of need satisfaction and need frustration in need-restrictive contexts is limited. To further test SDT's universality claim, we aimed to investigate the role of need satisfaction in two distinct autonomy-restrictive contexts. That is, in **Chapter 2** we focused on patients with an eating disorder who have been found to be overly concerned with both autonomy (here characterized as the desire to act independently and to have one's behavior under control) as well as dependency (i.e., feeling compelled to please others because of a strong concern with others' opinion) (e.g., Narduzzi & Jackson, 2000). As patients feel torn by these competitive strivings, there is less room for them to express their own interests and goals. In other words, patients with an eating disorder feel less volition in their daily life (Verschueren et al., 2016). Whereas patients with an eating disorder are likely to feel caged from within, prisoners are literally imprisoned which presumably limits their feelings of autonomy. We therefore focused on a sample of prisoners in **Chapter 3**. Prisons are typified by their autonomy-restrictive nature (Ashkar & Kenny, 2008; Goffman, 1961) as individuals are very limited in terms of their daily activities and because of the inherent power inequalities present within prison settings (e.g., Bosworth & Carrabine, 2001) which might be expected to further limit prisoners' sense of autonomy. Although both patients with an eating disorder as well as prisoners are assumed to

experience relatively low levels of autonomy, a positive relation between autonomy and well-being would still be expected based on SDT's universality claim.

3. Autonomy Support and Psychological Control: Supporting the Psychological Needs

3.1. Defining Autonomy Support and Psychological Control

As experiences of psychological need satisfaction have proven to be of crucial importance for people's well-being, much attention has been devoted to need-supportive contexts. Specifically, social contexts are said to foster individuals' psychological needs if they are autonomy-supportive, well-structured, and warm and involved. To the contrary, need-thwarting contexts are characterized by pressure, chaos, and coldness (Deci & Ryan, 2000). In the present dissertation, we focused specifically on autonomy support versus pressure (i.e., psychological control; Soenens & Vansteenkiste, 2010; Vansteenkiste & Soenens, 2015).

Autonomy support involves the promotion and nurturance of volitional functioning (e.g., Grolnick, Ryan, & Deci, 1991; Ryan, Deci, & Vansteenkiste, 2016). Such nurturance is characterized by the interest for and acknowledgement of the other's perspective and feelings (e.g., Deci, Eghrari, Patrick, & Leone, 1994), the encouragement of dialogue and participation by offering choices (e.g., Patall, Cooper, & Wynn, 2010) and stimulating initiative-taking (e.g., Reeve & Jang, 2006), the taking of the other's pace of development into account, and the provision of rationales for requests (e.g., Simons, Dewitte, & Lens, 2003). Finally, to foster individuals' sense of volition, autonomy-supportive social sources employ inviting, informative, and non-controlling language (e.g., Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004).

Contexts can, however, also be autonomy thwarting by employing control. A distinction has been made between two types of controlling interactions, namely externally controlling interactions in which the individual is pressured from without through the use of deadlines, punishment, and controlling rewards and internally controlling interactions in which the individual is pressured from

within by for example guilt-induction and shaming (Soenens & Vansteenkiste, 2010). We specifically focused on this latter type of control, also studied under the notion of psychological control, which is characterized by the minimization or ignorance of the other's frame of reference, the use of love withdrawal, and even personal attack and verbal hostility (Grolnick & Pomerantz, 2009; Soenens & Vansteenkiste, 2010). Note that the concept of control as defined in SDT refers to a pressuring and domineering style of interacting. As such, this concept is distinct from the provision of structure which, among other features, involves providing clear guidelines for behavior (Soenens & Vansteenkiste, 2010).

Similar to low need satisfaction not necessarily implying the existence of need frustration, a low level of autonomy support does not necessarily involve the presence of psychological control. To illustrate, a parent who provides few choices to the child (i.e., low autonomy support) does not necessarily actively thwart the child's psychological needs by withdrawing love and attention when the child behaves in an undesired manner. Recent research (e.g., Bartholomew et al., 2011) and theorizing (Vansteenkiste & Ryan, 2013) indeed indicates that these two concepts represent two distinct developmental pathways with autonomy support representing the bright pathway and psychological control representing the dark pathway.

Autonomy support and psychological control are hypothesized to relate to, respectively, the satisfaction or the frustration of each of the psychological needs. Thus, autonomy support would not only foster feelings of volition (i.e., autonomy satisfaction), but also experiences of competence and relatedness. For instance, an individual will feel capable (i.e., competence satisfaction) when he or she is allowed to take initiative and will feel accepted (i.e., relatedness satisfaction) when his or her perspective is acknowledged (both components of autonomy support). Similarly, psychological control is postulated to not only thwart the need for autonomy, but also the needs for competence and relatedness. To illustrate, an individual will feel rejected (i.e., relatedness frustration) when he or she gets ignored when acting in an undesired manner and will feel inept (i.e., competence frustration) when

his or her opinion is not taking into account. Consistent with this reasoning, Ahmad, Vansteenkiste and Soenens (2013) demonstrated that perceived psychologically controlling parenting by Jordanian adolescents related negatively to teacher-rated adjustment, with all three needs playing an explanatory role in this association.

3.2. Correlates of Autonomy Support and Psychological Control

Multiple studies have shown that whereas autonomy support is beneficial for individuals' psychological needs and well-being, psychological control impedes individuals' psychological needs and engenders ill-being and psychopathology (Vansteenkiste & Ryan, 2013). Specifically, autonomy support has been found to contribute to the engagement in prosocial behavior via increased need satisfaction (Gagne, 2003), increases in autonomous self-regulation, perceived competence, and enjoyment, and decreases in anxiety (Black & Deci, 2000), and greater academic self-motivation and well-being (Chirkov & Ryan, 2001). On the contrary, psychological control has been shown to relate to more internalizing distress via reduced need satisfaction (Costa, Soenens, Gugliandolo, Cuzzocrea, & Larcan, 2015), the severity of depression, maladaptive perfectionism and lower self-esteem (Soenens, Vansteenkiste, Luyten, Duriez, & Goossens, 2005), and more externalizing symptoms (Rogers, Buchanan, & Winchell, 2003).

These effects of autonomy support and psychological control have been found across diverse domains. In the parenting domain, for instance, studies showed that autonomy support related to school performance (Grolnick et al., 1991), interest in mathematics (Aunola, Viljaranta, Lehtinen, & Nurmi, 2013), and autonomous motivation for engaging in physical activity (Vierling, Standage, & Treasure, 2007). In contrast, psychologically controlling parenting was found to relate to adolescent ill-being and problem behaviors via reduced need satisfaction (Ahmad et al., 2013; Mabbe et al., 2016). Additionally, studies within the educational context have shown that teacher autonomy support related to beneficial outcomes such as student engagement (Reeve, Jang, Carrell, Jeon, & Barch, 2004),

whereas psychologically controlling teaching has found to be related to students' feelings of anger and bullying via experienced need frustration (Hein, Koka, & Hagger, 2015). Finally, within the clinical context, only a few studies examined the role of therapist autonomy support (with none examining the role of therapist psychological control). These studies showed that autonomy support from healthcare providers or therapists related to beneficial outcomes such as autonomous motivation for adherence to HIV medications among HIV+ patients (Kennedy, Goggin, & Nollen, 2004) and to autonomous motivation for participating in treatment among depressed outpatients (Zuroff, Koestner, Moskowitz, McBride, Marshall, & Bagby, 2007).

3.3. Antecedents of Autonomy Support and Psychological Control

Given the benefits associated with autonomy-supportive, relative to psychologically controlling, social contexts, another generation of studies has begun to document its antecedents. For instance, Landry et al. (2008) showed that mothers who had more trust in the natural, growth-oriented development of their children, acted in a more autonomy-supportive manner towards their 12 to 16 months old children. Deci and Ryan (1985) found that parents high on dispositional autonomy (meaning that they generally functioned volitionally and directed their lives towards authentic goals and interests) reported using a more autonomy-supportive style towards their children. With regard to psychological control, research has shown that parents high in evaluative concerns perfectionism, which involves the rigid pursuit of high personal standards (Soenens, Elliot, Goossens, Vansteenkiste, Luyten, & Duriez, 2005), and parents high in separation anxiety, which involves feeling anxious about the child's increased distance taking (Soenens, Vansteenkiste, Duriez, & Goossens, 2006), are more likely to adopt a psychologically controlling parenting style. While these studies concerned relatively stable personality features, the functioning of parents can also be influenced by more momentary states experienced at a specific time. Grolnick, Gurland, DeCourcey, and Jacob (2002), for instance, investigated internal pressure experienced by the mother at a specific moment as a predictor of

maternal parenting. This experience of internal pressure was induced experimentally in mothers working on school-like tasks with their children (3rd graders). Results showed that mothers who were pressured through experimental manipulation behaved in a more controlling style towards their children (e.g., by unsolicitedly checking the answers given by the child on the task), especially when mothers already had a controlling rearing style prior to entering the study (Grolnick et al., 2002).

3.4. Identifying Gaps in the Literature

Based on this overview, four gaps can be identified in the literature on autonomy-supportive and controlling socialization that deserve greater attention. First, autonomy support as experienced within vertical relationships has mostly been investigated in the parent-child, the teacher-child, or the coach-child relationship. Only a few studies focused on autonomy support from healthcare providers (e.g., Zuroff et al., 2007) and no studies to date directly examined autonomy support as provided by prison staff. We, therefore, focused on autonomy support from these social sources in **Chapter 2** and **Chapter 3**.

Second, most previous studies on autonomy support and psychological control have focused on vertical relationships where there is a difference in authority or expertise between two individuals (Deci, La Guardia, Moller, Scheiner, & Ryan, 2006). Examples of such vertical relationships are the parent-child, teacher-pupil and coach-athlete relationship. The fostering and also the impeding of individuals' psychological needs is, however, not only critical within vertical but also within horizontal relationships. Horizontal relationships are characterized by a similar level of authority between both individuals, such as between friends, romantic partners, siblings, or patients. Only a few studies thus far examined the role of autonomy support and psychological control within horizontal relationships. Deci et al. (2006) reported that autonomy support as experienced within close friendships related to need satisfaction and relationship quality. Further, Moreau and Mageau (2012) found that autonomy support from colleagues predicted health professionals' work satisfaction and psychological health.

Within the sibling relationship, Conger, Conger, and Scaramella (1997) showed that psychological control among siblings related to increases in adolescents' adjustment problems and to diminished self-confidence. Besides the scarce amount of studies on autonomy support and psychological control in horizontal relationships, most studies also focused on one particular source of autonomy support or psychological control instead of considering the unique relations between multiple sources and individuals' psychological functioning. Therefore, the relative contribution of different social figures' autonomy-supportive and controlling styles has remained understudied. To add to these underexplored issues, we examined in **Chapter 2** and **Chapter 8** the unique role of, respectively, parents', staff's, and fellow patients' autonomy support and of mother's, teacher's, and sibling's autonomy support and psychological control in the prediction of individuals' psychological functioning.

Third, although many studies have now shown the benefits associated with autonomy-supportive parenting and the detriments associated with psychologically controlling parenting, these almost exclusively focused on between-parent differences in parenting behavior. Emerging research, however, shows that parenting fluctuates significantly from day-to-day and that these daily fluctuations also relate to daily variations in children's well-being (e.g., Aunola, Tolvanen, Viljaranta, & Nurmi, 2013). To contribute to this upcoming line of work, we examined in **Chapter 8** the daily relations between parental autonomy support and psychological control, children's need satisfaction and frustration, and children's well-being and ill-being.

Fourth, recent research has begun to focus on need satisfaction and need frustration as sources of provided autonomy support and psychological control, for example within the coach-athlete (e.g., Stebbings, Taylor, Spray, & Ntoumanis, 2012) and the teacher-pupil (e.g., Van den Berghe, Soenens, Aelterman, Cardon, Tallir, & Haerens, 2014) relationship. These have postulated and found that when individuals experience in general a sense of psychological freedom (i.e., autonomy satisfaction), feel able to effectively engage in daily activities (i.e., competence satisfaction), and feel related to other persons (i.e., relatedness satisfaction), they are more able to be attuned to the other's viewpoint and to

encourage initiatives (i.e., to provide autonomy support). Instead, the frustration of these needs would lead individuals to adopt a more self-centered attitude, thereby imposing their own agenda upon other individuals in a pressuring way (i.e., psychological control). However, research in other relationships is preliminary and indirect (e.g., parent-child relationship; de Haan, Soenens, Dekovic, & Prinzie, 2013). Therefore, in **Chapter 9** we examined in a cross-sectional study the role of mothers' need satisfaction in the prediction of provided autonomy support. Additionally, we investigated whether the child's need satisfaction (presumably following from mother's autonomy support) would relate to more provided autonomy support towards the sibling (as reported by that sibling). In **Chapter 10** we built further on this study by examining possible mechanisms (i.e., stress and psychological availability) of the relation between parents' need experiences and their provided level of autonomy support and psychological control. To capture the dynamics of parenting, these relations were examined on a daily basis.

4. The Integration of Psychologically Need-satisfying and Need-frustrating Experiences

4.1. The Integrative Process

Within Self-Determination Theory, it is postulated that humans are growth-oriented organisms who naturally strive for integration (Deci & Ryan, 2000). Integration herein denotes the process through which people accept past and present experiences and harmonize these experiences within their sense of self (Deci & Ryan, 2000; Vansteenkiste et al., 2010; Vansteenkiste & Soenens, 2015). This integrative process is activated when individuals are confronted with experiences that are inconsistent with personally held ideals and values or that are at odds with one another. To illustrate, an experience of failure may threaten a person's self-view, an experience that needs to be acknowledged and integrated. The failure to do so may cause internal conflict, which then may manifest through rumination about or avoidance of the event. This process of integration can, however, be painful as the full acknowledgement of negative experiences may elicit feelings of sadness, fear, and anger (Mills & D'Mello, 2014). Besides negative experiences, also positive and rewarding experiences need to be

assimilated within one's sense of self. In other words, the integrative process involves both positive and negative experiences, which together should nourish the formation of a meaningful and coherent life narrative (Bauer, McAdams, & Pals, 2008). Consistent with developmental theories such as Erikson's (1950) model of psychosocial development, SDT argues that coming to terms with negative experiences from the past and building an identity containing both positive and negative past experiences represents a crucial task throughout the lifespan.

4.2. Correlates of the Integrative Process

This integrative process is regarded to be of crucial importance for individuals' current adaptive psychological functioning and thriving (Deci & Ryan, 2000; Vansteenkiste et al., 2010). Specifically, the integrative process enables individuals to be more in touch with the motives, emotions, and the meaning underlying their past actions, which allows them to pursue life goals that are consistent with their authentic self thereby enhancing their well-being (Weinstein et al., 2013). Indeed, Weinstein, Deci, and Ryan (2011; Study 5) showed that higher levels of acceptance of and connection with both positive and negative life events related to higher well-being. Additionally, Yeung, Lu, Wong, and Huynh (2016) found that acceptance of a negative event related to more posttraumatic growth. On the contrary, ruminating about past mistakes has been found to relate to more negative and less positive experienced affect (McLaughlin, Borkovec, & Sibrava, 2007), whereas experiencing intrusions of past stressful life events was found to relate to the severity of posttraumatic stress disorder symptoms (e.g., Michael, Ehlers, Halligan, & Clark, 2005).

In this dissertation, we focused specifically on the integration of need-satisfying and need-frustrating life events as these have been found to represent a crucial aspect of autobiographical memories (for an overview see Milyavskaya, Philippe, & Koestner, 2013). For instance, Philippe, Koestner, Beaulieu-Pelletier, Lecours, and Lekes (2012) found that participants' need satisfaction, as experienced in their memories, contributed uniquely to their well-being, above and beyond the

contribution of people's concurrent need satisfaction. Additionally, need frustration as experienced within a loss-related memory (i.e., the loss of something or someone important) has been found to relate to more depressive emotions (Philippe, Koestner, Lecours, Beaulieu-Pelletier, & Bois, 2011). Thus, the integration of need-related events seems to be of special relevance.

4.3. The Fostering or Hindering of the Integrative Process

The process of integration can be fostered or hindered by several factors (Deci & Ryan, 2000). In this dissertation, we focused on the role of three interindividual differences in the integration of need-related experiences. First, we examined whether self-congruence, that is, individuals' tendency to regulate their behavior on the basis of personally endorsed values, interests, and preferences (rather than on the basis of externally imposed expectations) (Weinstein et al., 2013), would relate to a better integration of such experiences. Preliminary research has indeed indicated that self-congruence related to a greater acceptance of one's strengths and weaknesses (Weinstein, Przybylski, & Ryan, 2012). Besides this potentially integration-promoting factor, we also examined the role of depressive symptoms and evaluative concerns perfectionism as potentially integration-impeding factors. Whereas depressive symptoms are characterized by a negative mood and a sense of helplessness (Beck, Steer, & Garbin, 1988), evaluative concerns perfectionism is typified by the rigid setting of unrealistically high personal standards and by doubts about one's performance, concerns over making mistakes, and harsh self-scrutiny (Blatt, 1995; Frost, Marten, Lahart, & Rosenblate, 1990). Previous studies have indeed indicated that individuals with a high level of depressive symptoms experience more intrusions of stressful memories (Brewin, Reynolds, & Tata, 1999) and are more likely to ruminate over past negative events (Watkins & Teasdale, 2001), while individuals high in evaluative concerns perfectionism tend to think and worry more frequently about their daily mistakes (e.g., Frost et al., 1997).

4.4. Identifying Gaps in the Literature

Two gaps can be clearly identified in the literature that deserve greater attention. First, within SDT, great importance is attached to the process of integration as this process is postulated to be crucial for individuals' well-being (Deci & Ryan, 2000). Although multiple studies investigated the link between integration and psychological functioning (e.g., Weinstein et al., 2011), these have not specifically focused on need-related experiences. As especially need-satisfying and need-frustrating life events have been found to represent a crucial aspect of autobiographical memories (Milyavskaya et al., 2013), integration of such experiences seems to be highly relevant. Therefore, in **Chapter 5**, this issue was addressed.

Second, most studies on the integration of past events focused especially on the dark side of the integrative process by (1) including only indicators of a poor integration (e.g., rumination; McLaughlin, et al., 2007) and (2) focusing only on the role of maladaptive personal characteristics such as depressive symptoms (Brewin et al., 1999) and perfectionism (Frost et al., 1997). As the absence of poor integration does not by definition imply the presence of adaptive integration and because it has clinical merit to examine potentially protective factors in the integrative process, a simultaneous examination of both the bright and dark side of integration is needed to get a more complete view on the integrative process. Therefore, in **Chapter 5** and **Chapter 6**, we included both positive (e.g., acceptance) and negative (e.g., avoidance) indicators of integration and examined the role of both integration-promoting (i.e., self-congruence) as well as integration-impeding personal characteristics (i.e., depressive symptoms and evaluative concerns perfectionism).

5. An Implicit Approach to the Measurement of Competence Satisfaction

5.1. From an Explicit to an Implicit Measure of Needs

Studies that have examined the psychological needs as proposed within SDT, almost exclusively relied on explicit measures of these needs. For example, studies have employed questionnaires such as the need satisfaction measure by Sheldon and colleagues (Sheldon, Elliot, Kim, & Kasser, 2001) to assess need satisfaction or, more recently, the Basic Psychological Need Satisfaction and Need Frustration scale (BPNSNF; Chen, Vansteenkiste, et al., 2015) to measure both need satisfaction and need frustration. These explicit measures rely on deliberate evaluations (e.g., Gawronski & Bodenhausen, 2011). To illustrate, an item such as "I feel confident that I can do things well" (i.e., competence satisfaction; BPNSNF) requires that individuals deliberately evaluate whether they, in general, feel like they can do things well. In contrast, implicit measures do not rely on such deliberate evaluations, but infer attitudes or feelings from behavioral responses (e.g., key-presses) in reaction time tasks.

Implicit measures have, compared to explicit measures, several advantages. First, as individuals are not required to deliberately think about the construct of interest, their reaction to these implicit measures are less susceptible to self-presentation tendencies, such as social desirability concerns and faking (e.g., Greenwald, Banaji, Rudman, Farnham, Nosek, & Mellott, 2002). Additionally, research has shown that implicit measures are better able at predicting spontaneous behaviors (e.g., Asendorpf, Banse, & Mücke, 2002). Greenwald, Poehlman, Uhlmann, and Banaji (2009) found in a large-scale meta-analysis that both implicit and parallel explicit measures had superior predictive value in specific construct domains, although overall the effect of the explicit measure (r = .36) was somewhat larger than the effect of the implicit measure (r = .27). Finally, there is accumulating research showing the relevance of investigating discrepancies between implicitly and explicitly assessed constructs. For example, Briñol, Petty, and Wheeler (2006) showed that the discrepancy between an implicit and

explicit self-concept related to more thinking about information related to this self-concept, presumably to reduce this inconsistency.

5.2. Identifying Gaps in the Literature

Although multiple studies have demonstrated the beneficial effects of competence satisfaction as proposed within SDT, these studies have relied on explicit measures. There are, however, several implicit measures available to assess a competence-related construct, namely achievement motivation or the need for achievement (Schultheiss & Brunstein, 2005). Despite being slightly related to SDT's need for competence, the need for achievement differs importantly as it reflects an acquired interpersonal difference variable concerning people's dispositional tendency of wanting to excel in achievement settings. To reap the potential benefits of an implicit measure of competence satisfaction, we aimed to develop and validate such a measure based on SDT's operationalization of competence in **Chapter 7**.

6. Research Objectives and Outline of the Dissertation

As the previous sections illustrate, the current state-of-the-art concerning the psychological needs as proposed within SDT calls for further research to address several conceptual and methodological gaps in the literature. The present dissertation attempted to move this literature forward by pursuing five broader goals, that is, (1) investigating the generalizability of the effects of psychological need satisfaction and frustration, (2) examining the integration of psychologically need-satisfying and need-frustrating experiences, (3) developing and validating an implicit measure of competence satisfaction, (4), investigating the role of autonomy support and psychological control in the prediction of need-based experiences and adjustment, and (5) examining the antecedent role of psychological need satisfaction and frustration in autonomy support and psychological control. These goals and corresponding research questions are outlined below (see Table 1 for an overview).

6.1. Goal 1: The Generalizability of the Effects of Psychological Need Satisfaction and Frustration

According to SDT, all individuals should benefit from need satisfaction and suffer from need frustration as these psychological needs are postulated to be innate and universally beneficial (Deci & Ryan, 2000). However, the potential moderating role of the context (i.e., being autonomy-restrictive or not) and of need strength has been underexplored. This issue was addressed in the first goal (see Figure 1 for a schematic overview).

Research Question 1: Is need satisfaction positively related to motivation and well-being within autonomy-restrictive contexts? Both patients with an eating disorder (Narduzzi & Jackson, 2000) as well prisoners (Ashkar & Kenny, 2008; Goffman, 1961) are likely to feel restricted in their autonomy. With respect to our first research question, we examined whether need satisfaction would also be relevant for these individuals who are in an autonomy-restrictive context. First, within **Chapter 2**, we examined among 84 patients with an eating disorder whether need satisfaction as experienced while working on the eating problem related to a higher level of autonomous motivation for working on the eating problem. Additionally, within a subgroup of patients with anorexia nervosa we investigated whether this increased autonomous motivation would relate to increases in BMI. Whereas we focused on individuals who likely feel imprisoned from within in Chapter 2, in **Chapter 3** we included individuals who are literally imprisoned (i.e., prisoners). Specifically, we examined whether autonomy satisfaction would relate to a higher quality of life among 156 prisoners. Across both studies, we expected that need satisfaction would indeed relate to more autonomous motivation and a higher quality of life, despite the autonomy-restrictiveness of the (inner or outer) context.

Research Question 2: Do individuals benefit and suffer from, respectively, autonomy satisfaction and autonomy frustration regardless of interpersonal differences in the strength of this need? To further examine SDT's universality claim stating that all individuals are effected by the

satisfaction and frustration of the needs, we examined in **Chapter 4** across two studies (among 224 South African adults and 156 Belgian prisoners) the possible moderating role of autonomy strength in these relations. We conceptualized autonomy strength as the desire for as well as the valuation of autonomy. As previous studies differed in their use of an explicit or an implicit measure of need strength, we included both types of measurements. In line with SDT's universality claim, we hypothesized that autonomy need strength would only play a minimal moderating role, such that the hypothesized main effect of autonomy need satisfaction and frustration would apply for individuals both high and low in autonomy strength. If some variation would exist in the strength of this association, it would be a matter of gradation.

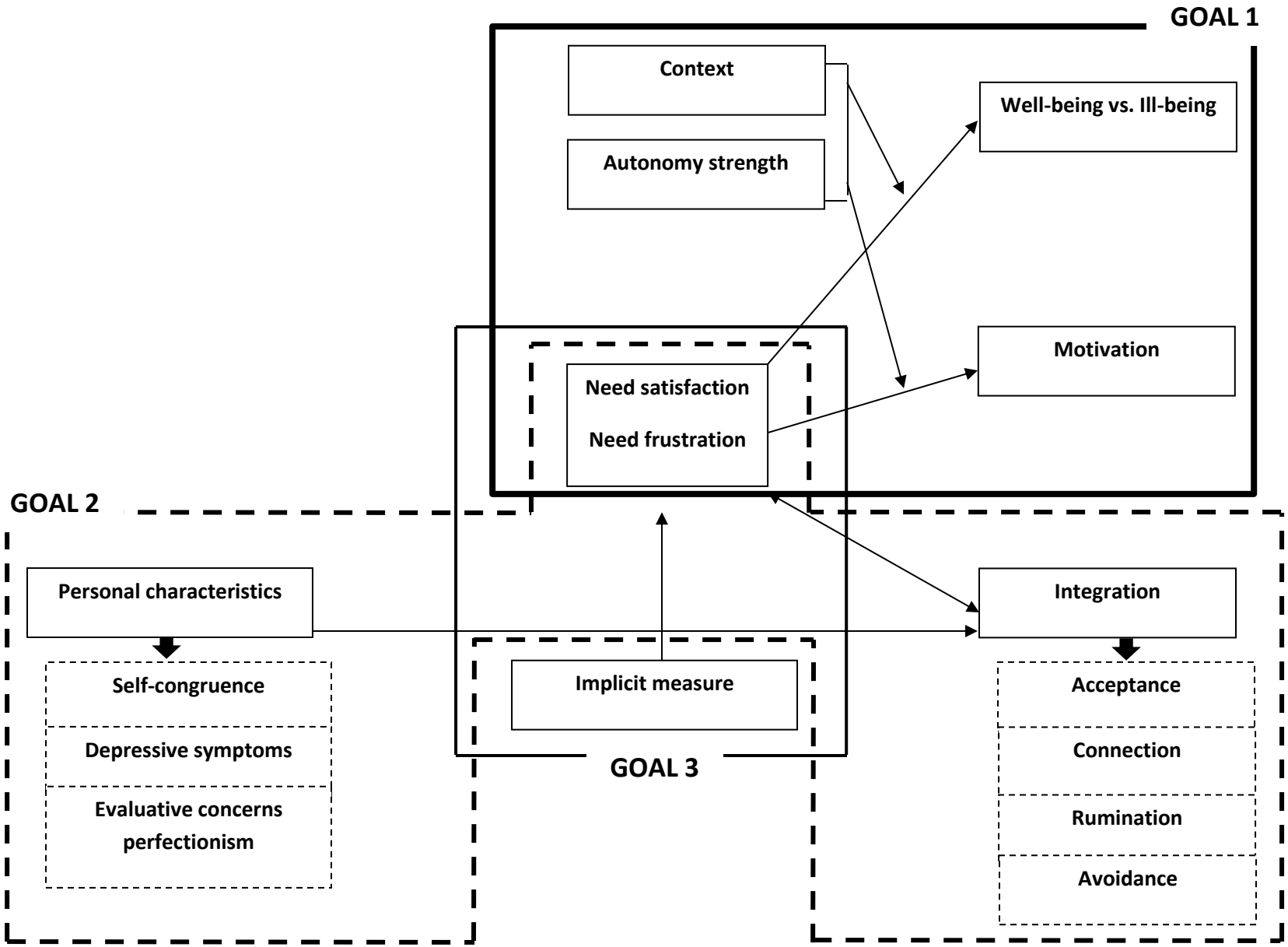

Figure 1. Schematic Overview of Goal 1, 2, and 3: The Generalizability, Integration, and Measurement of Need-related Experiences.

6.2. Goal 2: The Integration of Psychologically Need-satisfying and Need-frustrating Experiences

Having investigated the generalizability of the effects of need-satisfying and need-frustrating experiences, we subsequently aimed to examine how individuals integrate such need-related experiences in their sense of self and whether there are interindividual differences that could affect this integrative process (see Figure 1 for a schematic overview).

Research Question 3: Does the integration of need-related experiences relate to more positive and less negative memory-related well-being? In **Chapter 5**, we investigated among 132 late adolescents and 147 late adults whether a high-quality integration (indicated by acceptance and connection) and a poor integration (indicated by rumination) of need-related memories related to positive and negative memory-related affect. As need satisfaction has been found to represent an important aspect of autobiographical memories, we expected that a high-quality versus a poor integration of such need-related memories would be conducive to individuals' well-being.

Research Question 4: What is the role of personal characteristics in the integration of need-related experiences? To shed further light on the integrative process of need-related experiences, we investigated in Chapter 5 and Chapter 6 the role of personal characteristics herein, whereby we included both integration-promoting and integration-impeding characteristics to get a more balanced view on the integrative process. More specifically, in **Chapter 5** we examined the role of self-congruence (i.e., a potentially integration-promoting factor) and depressive symptoms (i.e., a potentially integration-impeding factor) among 132 late adolescents and 147 late adults. While self-congruence refers to individuals' tendency to regulate their behavior on the basis of personally endorsed values, interests, and preferences (Weinstein et al., 2013), depressive symptoms consist of, among others, a negative mood and a sense of pessimism (Beck et al., 1988). We hypothesized that self-congruence would relate to a better integration (i.e., less rumination, but more acceptance and

connection) of both past need-satisfying as well as need-frustrating events, while an opposite pattern was expected for depressive symptoms. As previous research found late adults to be better capable of integrating negative past events (Torges, Stewart, & Nolen-Hoeksema, 2008) and to display more autonomous functioning (Sheldon et al., 2005), we also expected that late adults would be better capable of integrating past need-related events (especially need-frustrating events) via an increased level of self-congruence. In **Chapter 6** we aimed to extend the cross-sectional self-report findings of Chapter 5 by investigating the integration of a standardized and experimentally-manipulated event. That is, we experimentally induced feelings of either success or failure and asked participants to report on their integration of this event one week later. In this way, we had more control over the event-related characteristics (such as the valence and the intensity) which gave us the opportunity to strengthen our findings concerning the role of a potentially integration-impeding personal characteristic in the integrative process. Specifically, we investigated, among 72 young adults, whether evaluative concerns perfectionism would negatively relate to a high-quality (indicated by acceptance) and positively to a poor integration (indicated by rumination and avoidance) of an experimentally-induced competence-frustrating (versus competence-satisfying) experience.

6.3. Goal 3: The Development and Validation of an Implicit Measure of Competence Satisfaction

Within SDT, there has been an almost exclusive focus on explicit measures of psychological need satisfaction and frustration. This is unfortunate, as the use of implicit measures has several important advantages. Although there have been previous studies employing implicit measures of competence-related concepts (e.g., Brunstein & Schmitt, 2004), these did not conceptualize these needs as in the SDT-framework.

Research Question 5: Can we develop a reliable and valid measure of implicit competence satisfaction? In **Chapter 7**, we aimed to develop and validate an implicit measure of competence satisfaction across five studies (see Figure 1 for a schematic overview). Specifically, we made use of two types of such implicit measures, that is, the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) and the Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010). Across five studies, we examined the relation between these implicit measures and their explicit counterpart, their nomological network (i.e., a network of theoretically and/or empirically related constructs), and their unique relations with study-specific outcomes. We hypothesized that these implicit measures would be meaningfully related to these variables.

6.4. Goal 4: The Role of Autonomy Support and Psychological Control in the Prediction of Need-based Experiences and Adjustment

A multitude of studies have now shown that while autonomy support is a positive predictor of individuals' psychological need satisfaction and well-being, psychological control relates to need frustration, ill-being, and even psychopathology (Vansteenkiste & Ryan, 2013). However, less is known about the role of autonomy support from healthcare providers and prison staff. In addition, the unique role of multiple social sources of autonomy support and psychological control in horizontal versus vertical relationships has been underexplored (see Figure 2 for a schematic overview).

Research Question 6: What is the role of autonomy support from healthcare providers and prison staff for individuals' psychological functioning?

Autonomy support as experienced within vertical relationships has mostly been investigated in the parent-child, the teacher-child, or the coach-child relationship. Only a few studies focused on autonomy support from healthcare providers (e.g., Zuroff et al., 2007) and no studies to date directly examined autonomy support as provided by prison staff. To shed light on the underexplored autonomy-

supportive role of these key social figures, we examined in **Chapter 2** the role of staff member autonomy support in the prediction of need satisfaction and motivation among inpatients with an eating disorder. Additionally, in **Chapter 3** we focused on afforded choice (i.e., an important facet of autonomy support) as perceived by prisoners (N = 156) and the relation with prisoners' autonomy satisfaction and quality of life. Across both chapters, we expected that autonomy support would relate significantly to individuals' needs, motivation and well-being.

Research Question 7: Do autonomy support and psychological control as experienced within both vertical and horizontal relationships contribute uniquely to individuals' psychological functioning? Autonomy support and psychological control have mostly been investigated within vertical relationships (e.g., Gagne, 2003) wherein there is a difference between authority or expertise between two individuals (Deci et al., 2006). Therefore, we aimed to shed more light on the unique role of autonomy support and psychological control in both vertical and horizontal relationships. In **Chapter 2**, 84 eating disorder patients reported on the perceived autonomy support from parents and staff (i.e., vertical relationships) and from fellow patients (i.e., horizontal relationship) in addition to filling out questionnaires concerning their need satisfaction and autonomous motivation across time. Moving towards a different population (i.e., non-clinical individuals) and using a different methodology (i.e., a within- instead of between-person design), we examined the daily role of perceived autonomy support and psychological control within two vertical relationships (i.e., mother-child; teacher-student) and within a horizontal relationship (i.e., siblings) among 154 children in **Chapter 8**. Children also reported daily on their need satisfaction, need frustration, well-being, and ill-being. Across both Chapter 2 and 8, we expected that autonomy support and psychological control as experienced within both vertical and horizontal relationships would relate to individuals' psychological functioning, with autonomy support relating especially to need satisfaction and well-being and psychological control relating particularly to need frustration and ill-being (in line with the distinct

roles of autonomy support/need satisfaction and psychological control/need frustration; Vansteenkiste & Ryan, 2013).

6.5. Goal 5: The Antecedent Role of Psychological Need Satisfaction and Frustration in Autonomy Support and Psychological Control

Given the crucial role of autonomy support and psychological control in individuals' psychological functioning, research has focused on identifying individual characteristics that facilitate the provision of autonomy support or engender the provision of psychological control (Grolnick et al., 2002; Soenens, Elliot, et al., 2005). We aimed to contribute to this emerging field by examining the antecedent role of psychological need satisfaction and frustration in the provision of autonomy support and psychological control (see Figure 2 for a schematic overview).

Research Question 8: Do need satisfaction and need frustration relate to provided autonomy support and psychological control and what are possible mechanisms? In **Chapter 9**, we aimed to examine the hypothesized antecedent role of psychological need satisfaction in the provided autonomy support in the mother-child relationship. Additionally, we examined whether the child's need satisfaction (following from maternal autonomy support) would enable him or her to be more autonomy supportive towards his or her sibling. These relations were investigated among 154 mothers and two of their elementary school-aged children. We hypothesized that need satisfaction would indeed enable mothers and children to be more autonomy supportive.

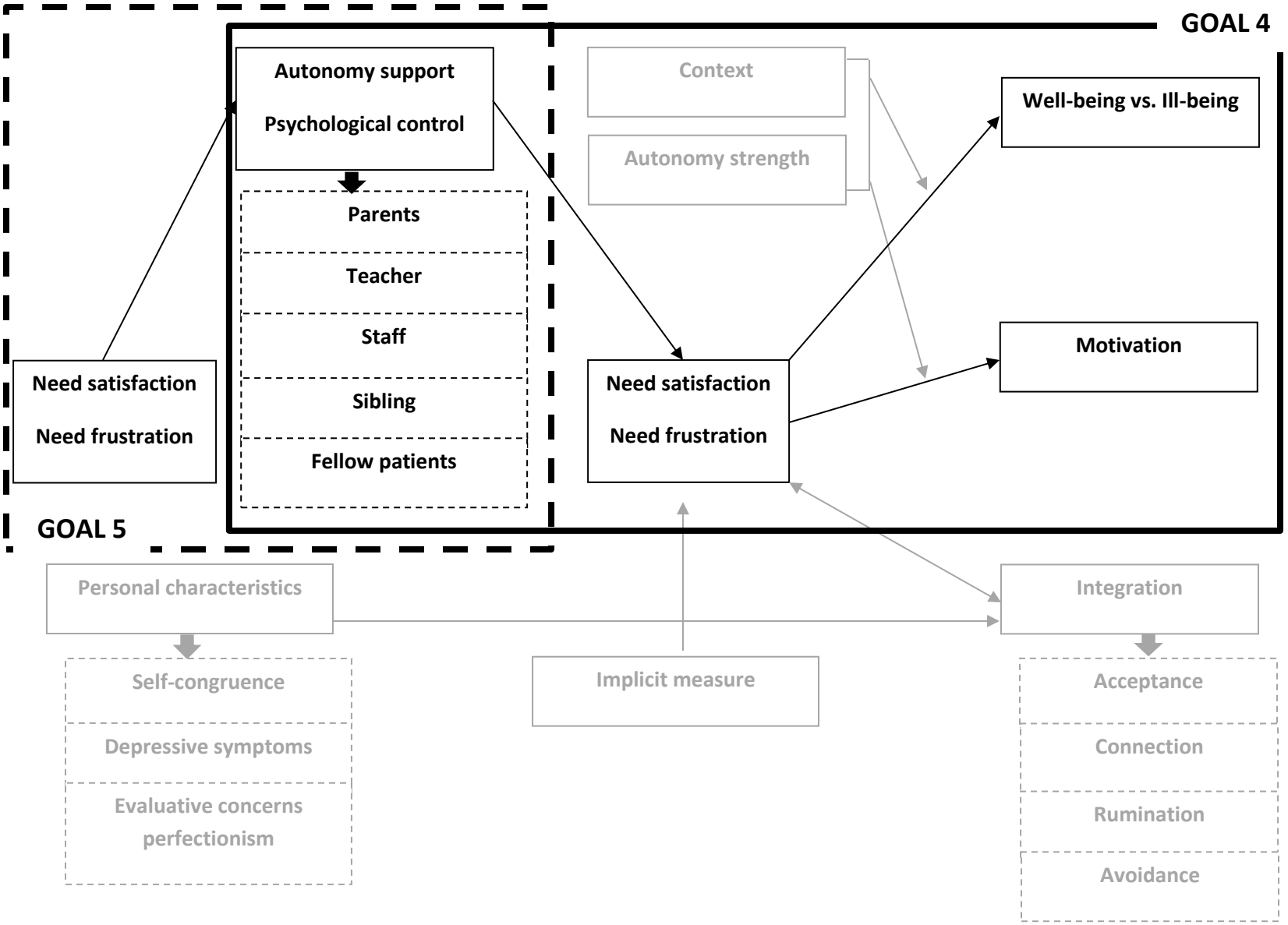

Figure 2. Schematic Overview of Goal 4 and 5: Antecedents and Outcomes of Autonomy Support and Psychological Control.

Chapter 10 aimed to extend Chapter 9 by (1) including both mothers and fathers, (2) examining both need satisfaction and need frustration as antecedents of provided autonomy support and also psychological control, (3) investigating possible mechanisms in these relations (i.e., psychological availability and stress), and (4) looking into these relations at the daily level. More specifically, we examined whether parental need satisfaction would relate to more provided autonomy support (and less provided psychological control) and whether parental need frustration would relate to more provided psychological control (and less provided autonomy support). Further, as need satisfaction and need frustration are assumed to be more distal sources of provided autonomy support and psychological control, we examined the mediating role of more proximal sources, that is, stress and psychological availability (Danner-Vlaardingerbroek, Kluwer, Van Steenbergen, & Van der Lippe, 2013). Additionally, as previous studies have shown that need satisfaction and need frustration are dynamic and malleable experiences susceptible to changes in the social environment (e.g., Reis, Sheldon, Gable, Roscoe, & Ryan; 2000; Verstuyf et al., 2013), we deemed it important to investigate the daily dynamics between these constructs and the provision of autonomy support and psychological control. Therefore, we conducted a diary study spanning seven days among 206 parents and one of their children.

Table 1

Overview of the Dissertation Goals and Corresponding Studies

		Total *N*	Design	Age (yrs)	Gender (% male)	Analytical techniques	Notes
GOAL 1: The generalizability of the effects of psychological need satisfaction and frustration							
Chapter 2	Study 1	84	Longitudinal	23	0%	Repeated measures ANOVA; SEM	Clinical sample
Chapter 3	Study 2	156	Cross-sectional	39	89%	SEM	Prison sample
Chapter 4	Study 3	224	Cross-sectional	24	54%	Hierarchical regression	
	Study 4	156	Cross-sectional	39	89%		(sample of Study 2)
GOAL 2: The integration of psychologically need-satisfying and need-frustrating experiences							
Chapter 5	Study 5	132	Cross-sectional	18	44%	SEM; multigroup	
		147		76	34%		
Chapter 6	Study 6	72	Longitudinal	22	15%	Hierarchical regression	Experimental
GOAL 3: The development and validation of an implicit measure of competence satisfaction							
Chapter 7	Study 7	62	Cross-sectional	19	15%	Mixed ANOVA and correlations	Clusters
	Study 8	67	Cross-sectional	22	21%	Correlations	
	Study 9	103	Cross-sectional	23	15%	MANOVA and correlations	Experimental
	Study 10	72	Cross-sectional	20	29%	MANOVA and correlations	Experimental
	Study 11	119	Cross-sectional	22	0%	Correlations	Clinical sample

Table 1 (continued)

Overview of the Dissertation Goals and Corresponding Studies

GOAL 4: The role of autonomy support and psychological control in the prediction of need-based experiences and adjustment							
Chapter 2	Study 1	84	Longitudinal	23	0%	Repeated measures ANOVA; SEM	Clinical sample
Chapter 3	Study 2	156	Cross-sectional	39	89%	SEM	Prison sample
Chapter 8	Study 12	154 siblings	Diary	9; 10	53% and 56%	Multilevel	
GOAL 5: The antecedent role of psychological need satisfaction and frustration in autonomy support and psychological control							
Chapter 9	Study 13	154 mothers;	Cross-sectional	39		SEM; multigroup	(sample of Study 12)
		siblings		9; 10	53% and 56%		
Chapter 10	Study 14	206 parents;	Diary	40; 42		Multilevel	
		children		10	47%		

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Fostering Self-endorsed Motivation to Change in Patients with an Eating Disorder: The Role of Perceived Autonomy Support and Psychological Need Satisfaction[1]

Although several studies have established the beneficial effects of self-endorsed forms of motivation for lasting therapeutic change, the way patients with an eating disorder can be encouraged to volitionally pursue change has received less attention. On the basis of Self- Determination Theory, this longitudinal study addressed the role of an autonomy-supportive environment and psychological need satisfaction in fostering self-endorsed motivation for change and subsequent weight gain. Female inpatients (N = 84) with mainly anorexia nervosa and bulimia nervosa filled out questionnaires at the onset of, during, and at the end of treatment regarding their perceived autonomy support from parents, staff members, and fellow patients, their psychological need satisfaction, and their reasons for undertaking change. Furthermore, the body mass index (BMI) of the patients at the onset and end of treatment was assessed by the staff. Path analyses were used to investigate the relations between these constructs. At the start of treatment, perceived parental autonomy support related positively to self-endorsed motivation through psychological need satisfaction. Perceived staff and fellow patients autonomy support related to changes in self-endorsed motivation over the course of treatment through fostering change in psychological need satisfaction. Finally, relative increases in self-endorsed motivation related to relative increases in BMI throughout treatment in a subgroup of patients with anorexia nervosa. These results point to the importance of an autonomy-supportive context for facilitating self-endorsed motivation.

[1] Van der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., Verstuyf, J., Boone, L., & Smets, J. (2014). Fostering self-endorsed motivation to change in patients with an eating disorder: The role of perceived autonomy support and psychological need satisfaction. *International Journal of Eating Disorders, 47*, 585-600. doi: 10.1002/eat.22266

Introduction

Motivation is considered a fundamental psychological resource contributing to positive therapy outcomes (Ryan, Lynch, Vansteenkiste, & Deci, 2011). Yet, patients with an eating disorder often lack motivation for treatment and change (Vansteenkiste, Soenens, & Vandereycken, 2005). Indeed, most patients show at least some degree of resistance to change (Engle & Arkowitz, 2006), which might explain the high rates of drop-out typically observed in this population (Wallier, Vibert, Berthoz, Huas, Hubert, & Godart, 2009). Furthermore, although motivation is often depicted as a dynamic process (rather than a stable attribute) that can evolve throughout therapy (Mansour et al., 2012), few studies have systematically examined changes in motivation in patients with an eating disorder (Allen, Fursland, Raykos, Steele, Watson, & Byrne, 2012; Geller, Zaitsoff, & Srikameswaran, 2005). In contrast, most studies have focused on patients' motivation at the onset of therapy. For instance, inpatients with anorexia nervosa who felt less ready to change at the start of therapy were found to benefit more (i.e., increased their readiness to change more) when following a motivation-oriented intervention (Wade, Frayne, Edwards, Robertson, & Gilchrist, 2009).

Increasingly, it is emphasized that patients' motivation for change manifests through the gradual acceptance of and willingness to change (Ryan et al., 2011; Vansteenkiste et al., 2005). For instance, within self-determination theory (SDT), a macro-theory on human motivation and behavioral change, it is stated that patients not only need to need help but also need to want help (Deci & Ryan, 2000; Miller & Rollnick, 2002). Patients are more likely to express a willingness to undertake change if they have come to fully endorse (i.e., internalized) the personal significance of change. Past research has shown that a self-endorsed rather than a pressured pursuit of change yields manifold benefits, including better treatment adherence (Zeldman, Ryan, & Fiscella, 2004), lower depressive symptomatology in patients with a depression (Zuroff, Koestner, Moskowitz, McBride, Marshall, & Bagby, 2007), and less eating preoccupation in a group of outpatients with bulimia-spectrum symptoms (Mansour et al., 2012).

The Personal Endorsement of Change

Various scholars in the field of patient motivation have emphasized the necessity for patients to be internally rather than externally motivated to undertake change (Miller & Rollnick, 2002; DiClemente, 1999). SDT is generally consistent with this claim (Vansteenkiste et al., 2005; Ryan & Deci, 2008), yet provides a more detailed account of different types of motives for change that fall along a continuum of increasing self-endorsement (i.e., internalization) (Ryan & Connell, 1989). Thus, the process of self-endorsement reflects the extent to which patients have come to fully accept the change, such that they are volitionally motivated to pursue change.

First, patients may undertake change to meet external pressures, including demanding expectations, threats of punishment, and criticism. As the reason for change is situated completely outside the patient, external regulation is characterized by a complete lack of acceptance (i.e., internalization) of the reason for change. A patient with an eating disorder who enters treatment as a result of parental demand displays external regulation. Patients can also pursue change to meet internal (rather than external) pressures. Such internal pressures involve the avoidance of shame, guilt, and anxiety, or the attainment of regard and esteem. This form of motivation has been labeled introjected regulation. A patient with an eating disorder who enters the clinic because otherwise she would feel guilty and thus feels as if she 'should' pursue change displays introjected regulation. Although the patient's motive for change is now internal to the person, the reason for change has not yet been fully accepted, as the change goes along with feelings of inner conflict and compulsion. A fuller form of self-endorsement is achieved when patients come to identify with the importance of change for oneself. In the case of identified regulation, a patient feels the personal relevance and necessity of change such that change is pursued more willingly. A patient with an eating disorder who enters treatment because she believes it is critical for her health concurs with the decision to change. Finally, when change is not only valuable by itself, but is perceived to be congruent with other important life values and interests a patient holds, the patient is said to display integrated regulation. A patient who pursues change because

she feels as if important goals and values in her life (e.g., intimate relationships, studies) are negatively affected by her eating disorder fully endorses the decision to change. The decision to change is anchored within other important life aspirations. Such an integrated regulation represents the fullest form of self-endorsed motivation (Deci & Ryan, 2000).

These different forms of motivation are said to fall along a continuum of increasing internalization or self-endorsement. The task for clinicians is to foster this process of gradual acceptance or self-endorsement during treatment. This might be especially challenging with patients with an eating disorder, as a lot of patients are ambivalent to make changes or resist change altogether (Vansteenkiste et al., 2005). Fostering self-endorsement of change is critical though as it has been found to relate to various beneficial therapy outcomes, including satisfaction with therapy and the importance attached to therapy (Pelletier, Tuson, & Haddad), medication adherence (Williams, Rodin, Ryan, Grolnick, & Deci, 1998), therapy attendance (Ryan, Plant, & O'Malley, 1995), and increased change (Michalak, Klappheck, & Kosfelder, 2004).

Specifically with regard to eating disorders, Vansteenkiste, Claes, Soenens, and Verstuyf (2013) found that external pressure to change was particularly elevated in patients with an eating disorder who engaged in non-suicidal self-injurious behaviors. Furthermore, Mansour et al. (2012) showed that more self-endorsed forms of motivation at pretreatment predicted lower levels of eating preoccupation and binge eating at post-treatment in a group of outpatients with bulimia-spectrum symptoms, even after controlling for pretreatment levels of binge eating and psychiatric symptoms. In addition, although not grounded in the SDT-perspective, Geller, Drab-Hudson, Whisenhunt, and Srikameswaran (2004) showed that patients with an eating disorder with elevated pre-contemplation scores, which reflect a reduced willingness to pursue change, were less likely to enroll in treatment and, when they did enroll, were more likely to drop out. To the best of our knowledge, few studies examined associations between motivation for treatment and changes in BMI. One exception is a study by Rieger et al. (2000) who investigated the effects of motivation on weight gain in inpatients with anorexia nervosa. Their results

showed that higher levels of readiness to change related to an increase in body mass index (BMI) in the subsequent weeks.

Fostering Self-Endorsed Motivation

Given the positive outcomes related to self-endorsed motivation, the question arises as to how the process of self-endorsement (i.e., internalization) can be nurtured. According to SDT, the social context can stimulate or hinder the gradual acceptance of change by, respectively, supporting or thwarting three innate and basic psychological needs, that is, the needs for autonomy, competence, and relatedness (Vansteenkiste & Ryan, 2013). The need for autonomy entails experiences of choicefulness and psychological freedom when carrying out an activity. To illustrate, the need for autonomy in a patient with anorexia nervosa is satisfied when she experiences a sense of initiative and volition while working on healthier eating habits. The need for competence concerns the experience of mastery and effectiveness in executing activities and handling challenges. Satisfaction of this need is, for example, apparent when a patient feels capable of adopting new and healthier eating behaviors. Finally, the need for relatedness constitutes having warm and trusting relationships. A patient who experiences a sense of trust with her therapist or who experiences a sense of closeness and understanding with fellow patients will feel satisfied with respect to her need for relatedness. Satisfaction of these three needs promotes positive outcomes including persistence, performance, and well-being (Deci & Ryan, 2000). An increasing number of recent studies have examined the role of need satisfaction in eating-related outcomes in nonclinical samples. For instance, whereas need satisfaction was found to relate negatively to body image concerns (Thøgersen-Ntoumani & Ntoumanis, 2007), need frustration (i.e., feeling controlled, feeling like a failure, and/or feeling socially isolated) related positively to binge-eating symptoms, both at the level of interindividual differences (Verstuyf, Vansteenkiste, & Soenens, 2012) and at the level of day-to-day fluctuations within individuals (Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013). Furthermore, Dwyer, Hornsey, Smith, Oei, and Dingle (2011) found, in a group of depressed and anxious patients, that autonomy need satisfaction during residential therapy

predicted decreases in anxious and depressive cognitions which, in turn, related to decreases in anxiety and depressive symptoms. Besides being essential for people's general optimal functioning and thriving, SDT claims that need satisfaction is the critical mechanism underlying the process of self-endorsement (Deci & Ryan, 2000). To use a metaphor, psychological need satisfaction represents the engine of self-endorsed change. That is, when the psychological needs get satisfied, the process of acceptance of change is more likely to unfold as clients have more energy available to work on their problems. Consistent with this, Markland and Tobin (2010) showed that need satisfaction facilitated self-endorsed motivation in women referred to an exercise scheme and Milyavskaya and Koestner (2011) found need satisfaction to relate to self-endorsed motivation across important life domains in a nonclinical population.

Autonomy-supportive Counseling

Given the critical role of psychological need satisfaction in the process of self-endorsed motivation, motivating social contexts are those that support the satisfaction of these needs. Stated differently, social contexts need to provide the fuel necessary for the engine (i.e., the needs) to get started and to function optimally. In SDT, contextual autonomy support is considered a crucial facet of a need-supportive counseling style (Deci & Ryan, 2000). Being autonomy-supportive vis-a-vis patients in a therapeutic setting entails taking their perspective, being responsive to their thoughts and feelings, and stimulating a sense of initiative (Ryan & Deci, 2008). Even if choices are constrained, autonomy-supportive agents could foster need satisfaction by empathizing with the patients' frame of reference and by providing a clear and meaningful rationale for a request. A controlling approach, on the other hand, entails the active thwarting of the patients' sense of volition by conveying pressure, for instance, through the use of coercive language (e.g., "you must follow these guidelines"), the use of pressuring deadlines and controlling rewards, and by engaging in manipulative strategies such as guilt-induction, shaming or conditional regard (Soenens & Vansteenkiste, 2010).

Both experimental and correlational studies in nonclinical samples have amply demonstrated that autonomy support fosters need satisfaction in a diversity of life domains, including school, coaching, and parent–child relationships (Deci & Ryan, 2000). In a therapeutic context, several studies provided evidence for the beneficial effects of perceived therapist autonomy support for various outcomes, including drop-out in patients with an eating disorder (Vandereycken & Vansteenkiste, 2009) and self-endorsed motivation in patients with a depression (Zuroff et al., 2007; Zuroff, Koestner, & Moskowitz, 2012) as well as in a heterogeneous sample of psychiatric patients (Pelletier et al., 1997).

From Therapists to Parents and Fellow Patients

Increasingly, parents are becoming involved in the treatment process of patients with an eating disorder, for instance, through the provision of education sessions (Downs & Blow, 2013). Yet, few, if any, studies have examined whether the way parents approach their daughters' eating problems relates to their motivation for treatment. Past work in nonclinical populations showed that perceived parental autonomy support related positively to adolescents' need satisfaction and self-endorsed motivation in a variety of life domains, including schooling, friendships, and morality (Soenens & Vansteenkiste, 2010).

A shared feature of therapists and parents is that they both have a hierarchical relationship with the patients. Yet, autonomy support is also assumed to play a role in more horizontal relationships such as friendships (Deci, La Guardia, Moller, Scheiner, & Ryan, 2006). In the context of work, studies have shown that autonomy support from colleagues and from supervisors contributed independently to work satisfaction and psychological health (Moreau & Mageau, 2012). Furthermore, Ntoumanis, Taylor, and Thøgersen-Ntoumani (2012) showed that both peer and coach support are important with regard to motivation in young athletes. Thus, autonomy support in horizontal relationships, such as relationships with peers or colleagues, seems important for motivation and well-being.

The Present Study

Guided by the hypothesized conceptual model depicted in Figure 1, the present study aimed to contribute to the existing literature on motivational dynamics in patients with eating disorders by pursuing the following four aims. First, we aimed to investigate possible mean-level changes in motivation. Does the group of patients show an overall increase in self-endorsed motivation throughout the treatment? In spite of the presumed dynamic nature of motivation, few studies have traced motivational changes during therapy. There are, however, two notable exceptions. Allen et al. (2012) showed that outpatients with an eating disorder receiving cognitive-behavioral therapy with four sessions of motivation-focused treatment, displayed more readiness to change at the end of therapy. Similarly, a study by Geller et al. (2005) demonstrated that the level of internality (i.e., pursuing change out of internal as opposed to external reasons) increased during residential eating disorders treatment. In the current study, we expected a mean-level increase in patients' self-endorsed motivation during treatment given that a motivation orientation phase was built into treatment (Vandereycken & Vansteenkiste, 2009).

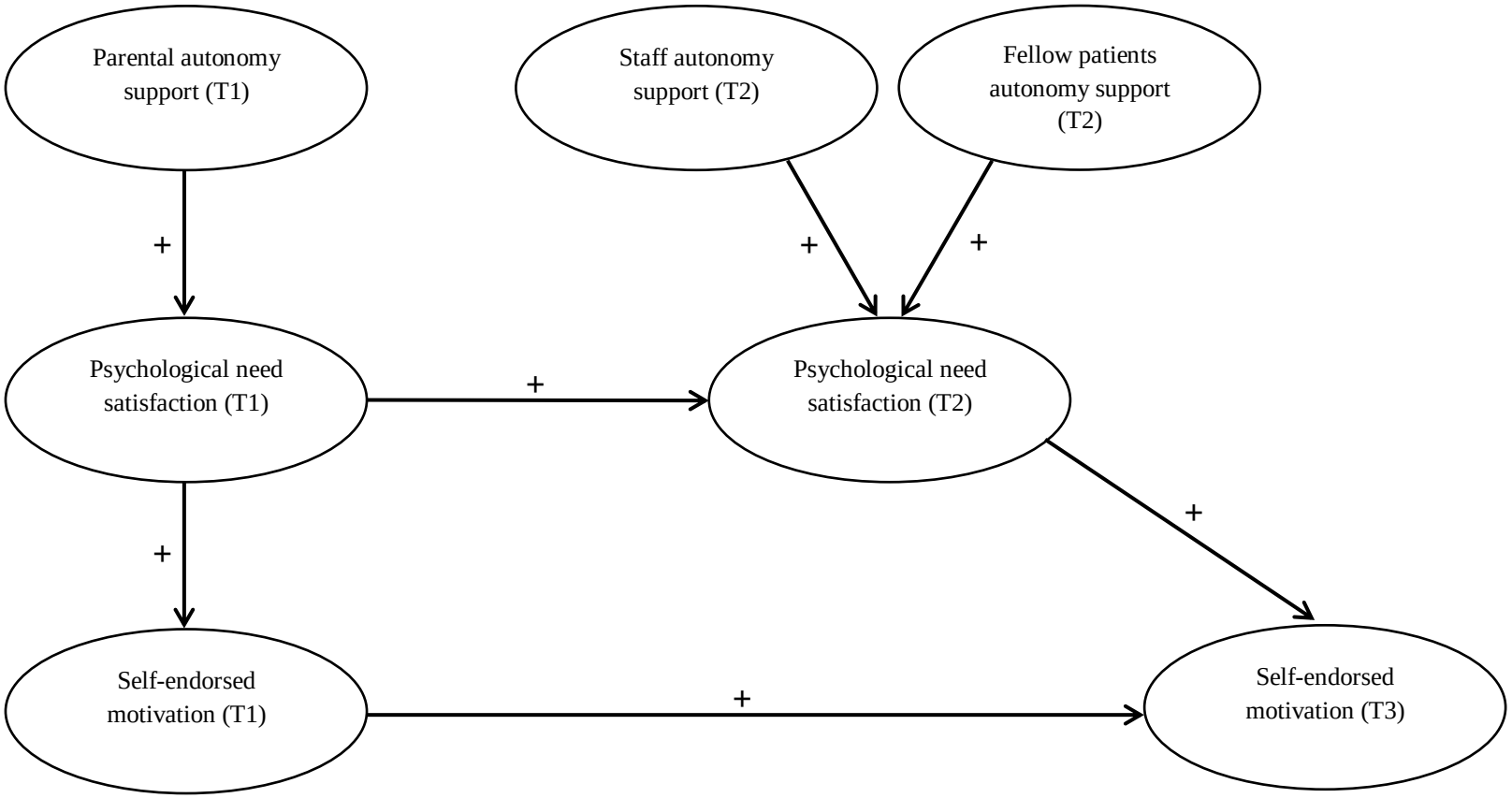

Figure 1. The Hypothesized Model based on Self-Determination Theory.

T = Time point.

A second aim involved examining the role of relative (i.e., rank-order) changes in psychological need satisfaction in relative changes in self-endorsed motivation. When one patient, relative to another patient displays an increase in self-endorsed motivation, is this relative increase driven by a relative increase in need satisfaction? On the basis of SDT and as depicted in the lower parts of Figure 1, we anticipated that this movement towards more self-endorsed motivation across therapy would indeed be driven by experiences of need satisfaction during therapy.

Third, to provide a more comprehensive picture of whether different motivational sources can facilitate need satisfaction and self-endorsed motivation, this study addressed simultaneously the role of parents, staff members, and fellow patients. We considered it meaningful to examine the role of patients as they were involved in group therapy. Specifically, we examined whether perceived parental autonomy support would relate to the initial levels of need satisfaction and self-endorsed motivation patients bring into therapy. Next, the degree of perceived autonomy support provided by staff members and fellow patients was expected to relate to rank-order changes in need satisfaction and self-endorsed motivation during the therapeutic process (see Fig. 1). As can be noticed, psychological need satisfaction was assigned a central place in the model as the mechanism underlying self-endorsed motivation, with three different resources feeding into experienced need satisfaction at different moments.

Fourth, given the limited number of studies on the role of motivation in eating disorder patients' weight gain during therapy, a final aim of the present study was to relate relative changes in self-endorsed motivation to relative changes in BMI in a subsample of anorectic patients. We expected changes in self-endorsed motivation to relate to changes in BMI throughout therapy.

Method

Participants and Procedure

This longitudinal study made use of two partly overlapping subsamples, which were collected as part of a broader study (Soenens, Vansteenkiste, Vandereycken, Luyten, Sierens, & Goossens, 2008; Vansteenkiste et al., 2013; Vandereycken & Vansteenkiste, 2009) on the treatment of patients diagnosed with an eating disorder. In this broader study, 127 patients filled out a questionnaire at admission (T1), while only a part of this broader sample completed questionnaires 2 weeks after the start of treatment (T2) and at the end of treatment (T3). The two longitudinal samples used in the context of this study were subsamples of this broader sample. Specifically, the first subsample (n = 84) consisted of patients who participated both at T1 and at least one more time. Furthermore, this subsample consisted of patients with different eating diagnoses and was employed to address the first three aims. The second subsample (n = 67) consisted only of patients with anorexia nervosa and was employed to investigate the fourth aim. In total, 45 out of the 67 individuals in the second subsample also belonged to the first subsample such that the second subsample had 22 unique cases (i.e., 67–45) and the first subsample had 39 unique cases (i.e., 84–45). In light of the substantial overlap between the two subsamples, the larger sample size of the first subsample, the fact that three out of four research aims were investigated by means of the first subsample, and that there were no significant differences with respect to background characteristics between the two subsamples, we only describe the background characteristics of the first subsample here below. However, we do provide information concerning BMI of the second subsample because this is the critical outcome variable in the analysis with this subsample.

Participants from the first subsample were young and adult females aged 15–45 years (M = 22.92; SD = 6.73) who were hospitalized for an inpatient treatment for eating disorders in a Belgian clinic. Eating disorder diagnoses were based on criteria of the DSM-IV (American Psychiatric Association, 1994) determined by a questionnaire (i.e., the Eating Disorders Evaluation Scale;

Vandereycken, 1993) and a standardized interview. The diagnoses obtained were as follows (BMI is included in brackets per diagnosis type): 38 (45%) belonged to the anorexia nervosa restricting type (*M*BMI = 14.18, *SD* = 1.67), 7 (8%) to the anorexia nervosa bingeing-purging type (*M*BMI = 16.17, *SD* = 2.12), 22 (26%) to bulimia nervosa (*M*BMI = 20.19, *SD* = 4.65), 16 (19%) to eating disorder not otherwise specified (*M*BMI = 20.70, *SD* = 5.84); the diagnosis of one patient was missing. The current treatment lasted on average 135.70 (*SD* = 50.20) days, that is, about 4 months, and ranged between 25 and 249 days. On average, patients had been ill for about 4 years (*M* = 4.33, *SD* = 1.59, range 2–7) and had followed on average 3.24 (*SD* = 1.30) and 1.85 (*SD* = 1.17) ambulant and residential treatments, respectively. Patients' education level (i.e., highest obtained degree) was as follows: 24% completed only elementary school, 33% had secondary education, 38% had postsecondary education, and information was missing for four patients. Finally, the majority (*n* = 64; 76.0%) of the patients came from intact homes and 56 (66.7%) still lived with (one of) their parents. With regard to subsample 2, 54 (81%) belonged to the anorexia nervosa restricting type (*M*BMI = 14.13, *SD* = 1.78) and 13 (19%) to the anorexia nervosa bingeing-purging type (*M*BMI = 16.14, *SD* = 1.82).

The inpatient treatment consisted of several phases. First, patients entered a motivation orientation phase (lasting 3 weeks or less), including psycho-education, motivational exercises to help patients reflect on the pro's and con's of changing their eating behavior, exploratory group sessions, and a one-day try out in the treatment group as to find out whether the treatment conditions would fit with their viewpoint (Vandereycken & Vansteenkiste, 2009). If patients decided to enroll in the program, a multidisciplinary treatment, mostly in group format, was offered to them, consisting of a combination of psycho-education, expressive therapy, psychomotor therapy, and education about food. At admission and when necessary, there were also individual therapy sessions. Finally, family meetings were organized and family therapy was offered optionally. Treatment duration could in theory vary between 4 and 5 months of which the last 4 weeks could be spent in day treatment. The end of treatment was highly dependent on the individual. The patient set goals for herself during the beginning

of treatment. These goals were pursued and evaluated on an individual basis and adapted if needed. When a patient was able to regulate her eating behavior in a healthy way and felt capable to take personal responsibility for this, then treatment could be terminated. At the end phase of the residential treatment, arrangements were made for ambulant care.

Patients completed several questionnaires at three time points. At T1, the sample originally consisted of 127 participants. To investigate whether our first subsample of 84 participants would be representative for the population of patients filling out a questionnaire at entrance, a binary logistic regression analysis was performed. We chose to use regression analysis rather than univariate ANOVAs to compare differences between completers and noncompleters because regression analysis allowed us to examine these differences with regard to a large number of variables simultaneously. We investigated whether these 84 participants (dummy coded as 1) differed from the 43 individuals who only took part at T1 (dummy coded as 0) with respect to demographic variables and psychological constructs assessed at T1. In Step 1, the demographic variables, namely age, diagnosis, the number of ambulant and residential treatments, and the duration of the eating problem were entered to predict nonparticipation at T2 and T3. Type of diagnosis (1 = anorexia nervosa restricting type; 2 = anorexia nervosa bingeing-purging type; 3 = bulimia nervosa; 4 = eating disorder not otherwise specified) was defined as a categorical variable with the last category indicated as the reference category. The chi-square statistic in Step 1 was not significant ($\chi^2(7) = 8.70$, $p = .28$). When introducing the psychological constructs (i.e., parental autonomy support, psychological need satisfaction, and self-endorsed motivation) in Step 2, the overall model was again not significant ($\chi^2(10) = 13.86$, $p = .18$). These results indicate that patients not participating in subsequent assessments did not differ in terms of demographic or psychological variables from the patients who participated at least twice.

Participation was anonymous and voluntary. Furthermore, patients (and, in case of minors, the parents) gave their written consent. In addition, the university Institutional Review Board and the Ethical Committee of the hospital gave approval for the study. At T1, participants completed

questionnaires concerning demographic information, perceived parental autonomy support, need satisfaction and motivation. At T2, perceived staff and fellow patients' autonomy support, need satisfaction and motivation

were assessed. Finally, at T3, motivation was assessed again.[2] Patients filled out the questionnaires alone in their rooms in the clinic on a paper and pencil test. A likert scale ranging from 1 (*completely disagree/completely not true*) to 5 (*completely agree/completely true*) was used for all scales. BMI scores from T1 and T3 were collected through clinical records provided by the staff.

Measures

Autonomy Support: Parents (T1). At T1, patients filled out a nine-item questionnaire tapping into perceived parental autonomy support with regard to their eating problems. We adapted a previously developed scale of global parental autonomy support (Luyckx, Soenens, Vansteenkiste, Berzonsky, & Goossens, 2007; Soenens et al., 2007) [which is based on the well-validated scales of parental autonomy support (i.e., perceptions of parents scale; Grolnick, Ryan, & Deci, 1991) and parental control (i.e., psychological control scale—youth self-report; Barber, 1996)] to assess parental autonomy support in the domain of eating problems. Items tapped into both perceived support for autonomy (e.g., "My parents help me to freely decide to what extent and how I want to change something about my eating problem") and perceived controlling behavior (e.g., "My parents try really hard to change my eating habits"). The items tapping into controlling parenting were reversed scored to obtain an aggregate score of perceived parental autonomy support ($\alpha = .81$). To provide further support for the convergent validity of this newly developed scale, we looked at the correlation between this newly developed questionnaire and the original global measure of parental autonomy support relative to control which was also filled out by the patients. As can be expected, the domain-specific and the general measure of parental autonomy support scales correlated positively ($r(82) = .56$, $p < .01$).

[2] Although more questionnaires were filled out by the participants at the three time points, we only focused on a subset of these in the current study.

Autonomy Support: Staff and Fellow Patients (T2). Perceived autonomy support from staff members was assessed using the shortened 6-item version of the well-validated Health Care Climate Questionnaire (HCCQ; Williams, Grow, Freedman, Ryan, & Deci, 1996). Items (e.g., "The staff/my fellow patients listen to the things I would like to do concerning my eating problem") were slightly adjusted to the context of this study. Moreover, given that the HCCQ does not contain controlling items, we added five items tapping into autonomy-suppressing behaviors (e.g., "The staff/my fellow patients try really hard to change my eating habits"). These five self-constructed items were adapted from the Psychological Control Scale—Youth Self-Report (Barber, 1996). Participants were instructed to report their general experiences with staff members at the clinic (i.e., psychologists, ergotherapists, and nurses). The items tapping into perceived autonomy support and control by fellow patients were similar, although two items were slightly modified to make them appropriate for peer-to-peer interactions. To obtain an aggregate score of autonomy support received from the staff members as well as from the fellow patients, controlling items were reversed and summed (α = .83 and .80 for staff and fellow patients autonomy support, respectively).

Need Satisfaction in Dealing with Eating Problems (T1, T2). To tap into experiences of psychological need satisfaction while working on their eating problem, patients filled out an adapted version of the basic psychological needs scale (BPNS; Gagné, 2003). Items tapped into satisfaction of the three needs (four items per need) postulated within SDT, namely relatedness (e.g., "I have good and satisfying conversations with other people about my eating problem"), competence (e.g., "I have confidence in my own capabilities to find a solution to my eating problem"), and autonomy (e.g., "To change something about my eating problem is my own free choice"). An average need satisfaction score was created by combining these three subscales as we were interested in general need satisfaction as an underlying mechanism of self-endorsed motivation (Sheldon & Elliot, 1999). Moreover, these combined scores showed good reliability (α = .85 at T1 and α = .88 at T2).

Motives for Eating Regulation (T1, T2, T3). The Self-Regulation Questionnaire-Eating Problems (Vansteenkiste et al., 2013) was employed to assess patients' motives for working on their eating problems. Four different motives were assessed: external regulation (e.g., "because others would be mad at me if I wouldn't do so"), introjection (e.g., "because I would feel guilty and ashamed if I would not"), identification (e.g., "because this is personally important to me"), and integration (e.g., "because I have thought well about this issue and I believe that taking responsibility for my eating problem will be important for other things in my life"). The 16 items (4 per motive) were preceded by the following stem: 'The reason why I would try to deal with my eating problem in a responsible way is . . .'. We deliberately chose to formulate this item stem broadly and to not specify a particular eating problem in the stem because we wanted the questionnaire to be relevant across types of eating disorder diagnoses. As such, scores of eating disorder patients with different diagnoses could be directly compared and all participants could be included in the analyses. On the basis of a principal component analysis conducted on this same sample in another contribution (Vansteenkiste et al., 2013), the subscales for integrated and identified motives were summed to create an internalized motive subscale. Given that the correlation between the three remaining subscales (i.e., internalized, introjected, and external regulation) followed an ordered pattern indicative of increasing self-acceptance of change, we combined, in line with previous work (Neyrinck, Vansteenkiste, Lens, Duriez, & Hutsebaut, 2006), the different subscales into a composite score by weighting each of the subscales depending on their location on the self-endorsement continuum. Specifically, the composite score of self-endorsed change was computed as follows: (external * -2) + (introjected * -1) + (identified/ integrated * 3). In other words, the composite score consisted of a weighted combination of volitional and pressuring forms of motivation, wherein the volitional motives were given a positive weight and the pressuring motives were given a negative weight. Furthermore, because external motivation reflects a complete lack of acceptance of change, whereas introjected motivation reflects partial acceptance, external motivation

was given a more negative weight. Overall then, higher scores on this scale indicate higher levels self-endorsed motivation. This combined scale showed good reliability (α = .83 at all three time points).

Body Mass Index (T1, T3). We determined weight gains in patients with anorexia nervosa by looking at the BMI at admission and the BMI at discharge, which were collected through participants' clinical records as provided by the staff. The BMI is defined by an individual's body mass divided by the square of her height.

Plan of Analyses

To examine mean-level changes in self-endorsed motivation during treatment (Aim 1, subsample 1), we performed a repeated measures ANOVA. To examine the relation between relative changes in need satisfaction and self-endorsed motivation (Aim 2, subsample 1), to investigate the role of perceived autonomy support (Aim 3, subsample 1) and to examine the effects of relative changes in self-endorsed motivation on weight gain in anorectic patients (Aim 4, subsample 2), path models were tested using MPlus 7 (Muthén & Muthén, 2012) with maximum-likelihood as estimator. In these path models (see Fig. 1 for a graphical display of the hypothesized model) we modeled rank-order change in self-endorsed motivation, need satisfaction, and BMI by controlling for initial levels of these variables at the onset of the study (Caspi & Roberts, 2001). In both subsamples there were missing data. With respect to the first subsample, all 84 participants had participated at T1, but some did not participate at T2 (8.3%) or at T3 (53.6%). Little's MCAR test (1988) indicated that these missing data were missing completely at random ($\chi^2(626) = 234.77$, $p = 1.00$). With respect to the second subsample, all 67 participants had participated at T1, but at T3 only 40.3% participated. However, these missing data were missing completely at random according to Little's MCAR test (1988) ($\chi^2(160) = 50.83$, $p = 1.00$). Because missing data were missing at random, the use of the full information maximum likelihood (FIML) procedure was appropriate to estimate missing data for both subsamples separately (Schafer & Graham, 2002).

To test indirect effects, we used bootstrapping (using 1,000 draws), a nonparametric resampling procedure that is currently highly recommended (Preacher & Hayes, 2008). Several indices were employed to evaluate the model fit, namely the χ^2 test, the comparative fit index (CFI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA). An acceptable fit was indicated by χ^2/df ratio of 2 or below, CFI values of .90 or above, and SRMR and RMSEA values of around .08 or below (Hu & Bentler, 1999; Kline, 2005). In total, seven different structural models were tested, which were built gradually. In all models we controlled for background variables (e.g., the number of previous ambulant treatment) that correlated significantly with the study variables. Consistent with Aim 2, the first model examined whether changes in need satisfaction would relate to changes in self-endorsed motivation while controlling for baseline levels of need satisfaction and self-endorsed motivation. In the next four models, we examined, consistent with Aim 3, the role of perceived autonomy support from different social sources, namely (a) from parents at T1 in the prediction of need satisfaction at T1 (Model 2); (b) from the staff members at T2 in the prediction of need satisfaction at T2, when controlling for baseline levels in need satisfaction (Model 3); (c) from fellow patients at T2 in the prediction of need satisfaction at T2, when controlling for baseline levels in need satisfaction (Model 4). In both Models 3 and 4, we also included parental autonomy support at T1, yet focused on a single source of within-treatment autonomy support (i.e., either the staff or the fellow patients) to examine their separate contribution. In Model 5, staff and fellow patients autonomy support were simultaneously modeled so as to examine their unique contribution to changes in need satisfaction and subsequent self-endorsed motivation. Model 6 was a follow-up model, in which fellow patients autonomy support was modeled as an intervening variable between perceived staff autonomy support and need satisfaction. The second-order Akaike Information Criterion (AICc; suitable for small sample sizes) was used to decide which of these two alternative models (Model 5 and Model 6) was the best with respect to fit to the data and simplicity, with a smaller AICc indicating the better model (Burnham & Anderson, 2004). Finally, in Model 7 (employing subsample 2) we investigated, consistent with Aim

4, whether increases in self-endorsed motivation would relate to increases in BMI throughout treatment in a subsample of patients with anorexia nervosa, when controlling for treatment duration.

Results

Descriptive Statistics and Preliminary Analyses

To obtain a first and descriptive understanding of the relations between the study variables in subsample 1, bivariate correlation analyses were performed (see Appendix). Perceived parental autonomy support did not relate to perceived autonomy support from the staff members ($r(82) = .18$, $p > .05$) or from the fellow patients ($r(82) = 2.06$, $p > .05$), although these latter two were related ($r(82) = .59$, $p < .01$). Perceived parental autonomy support related positively to need satisfaction at T1 ($r(82) = .39$, $p < .01$) and T2 ($r(82) = .33$, $p < .01$) as well as to self-endorsement at T1 ($r(82) = .33$, $p < .01$) and T3 ($r(82) = .30$, $p < .01$), but not at T2 ($r(82) = .18$, $p > .05$). All correlations between autonomy-support provided by staff and fellow patients (T2) and need satisfaction (T2) and self-endorsement (T2 and T3) were significant and positive (with *r*s ranging between .26 and .70, all *p*s < .05). Similarly, all correlations between need satisfaction and self-endorsed change, within and between time points, were significantly positive (with *r*s ranging between .26 and .73, all *p*s < .05). Both self-endorsed motivation and need satisfaction displayed significant rank-order stability across the time points (with correlations ranging between .33 and .70, all *p*s < .01). Finally, BMI also displayed significant rank-order stability between T1 and T3 ($r(82) = .54$, $p < .01$).

Correlation analyses also showed that the number of ambulant treatments related positively to need satisfaction at T2 ($r(82) = .32$, $p < .01$) and to self-endorsement at T3 ($r(82) = .30$, $p < .01$), that age related positively to self-endorsement at T3 ($r(82) = .24$, $p < .03$), and that BMI at T1 related positively to need satisfaction at T2 ($r(82) = .29$, $p < .01$). Accordingly, these variables were controlled for in subsequent model testing. Other background variables (i.e., diagnosis type, duration of illness,

number of previous residential treatments, education level, home and living situation, and treatment duration) were not correlated with the study variables and were not considered further.

As for subsample 2, bivariate correlation analyses showed that BMI at T3 related significantly to diagnosis type (anorexia nervosa restrictive type coded as 1 and anorexia nervosa bingeing-purging type coded as 2) ($r(65) = .34$, $p < .01$) as well as to treatment duration ($r(63) = .60$, $p < .01$). Therefore, we controlled for these two variables in the analyses related to subsample 2.

Primary Analyses

Aim 1: Examining Mean-Level Changes in Self-endorsed Motivation During Treatment. A repeated measures ANOVA with a Greenhouse–Geisser correction (due to violation of the assumption of sphericity) revealed a significant linear increase in self-endorsed motivation across the three time points ($F(1, 83) = 6.79$, $p < .02$ ($\eta^2 = .08$)). Although there was a steady increase in self-endorsed motivation per time point (i.e., T1 $M = 18.84$, $SD = 13.75$; T2 $M = 20.78$, $SD = 12.56$; T3 $M = 23.00$, $SD = 11.30$), post-hoc tests employing the Bonferroni correction revealed that there was only a significant difference between T1 and T3 ($p < .04$).

Aim 2: Psychological Need Satisfaction as the Fuel for Self-Endorsed Motivation. Fit indices of all structural models can be found in Table 1. In the first structural model we examined whether rank-order changes in need satisfaction would relate to rank-order changes in self-endorsed motivation. To do so, we allowed paths from need satisfaction at T2 to self-endorsed motivation at T3, while controlling for baseline differences in these constructs.[3] Subsequently, a reciprocal path from

[3] We also tested an alternative model by instead of controlling for baseline self-endorsed motivation, we controlled for self-endorsed motivation at T2. We added paths from need satisfaction at T2 to self-endorsed motivation at T2 and T3. In addition, autoregressive paths between need satisfaction at T1 and T2, and between self-endorsed motivation at T2 and T3 were allowed. Need satisfaction at T2 related strongly to self-endorsed motivation at T2 ($\beta = .73$, $p < .001$), but less strong to self-endorsed motivation at T3 ($\beta = .20$, $p > .05$). Therefore, we decided to control only for self-endorsed motivation at baseline and not at T2, because it seems that changes in need satisfaction can predict changes in self-endorsed motivation during the entire treatment, but not changes in self-endorsed motivation between T2 and T3.

self-endorsed motivation at baseline to need satisfaction at T2 was added to investigate whether patients with elevated levels of initial self-endorsed motivation derive more subsequent need satisfaction from the therapy. This model had an excellent fit (Table 1). Specifically, relative increases in need satisfaction from T1 to T2 had a marginally significant effect on relative increases in self-endorsed motivation from T1 to T3 ($\beta = .33$, $p < .08$). These results thus suggest that changes in need satisfaction tended to relate to changes in self-endorsed motivation, suggesting that need satisfaction may be the fuel for increases in self-endorsed motivation. Interestingly, the reversed relation also emerged, with self-endorsed motivation at T1 relating positively to relative increases in need satisfaction from T1 to T2 ($\beta = .27$, $p < .03$). Said differently, need satisfaction and self-endorsed change seem to yield a reciprocal relation to each other over time.

Aim 3: The Role of Contextual Perceived Autonomy Support. Model 2, in which parental autonomy support at T1 was added to Model 1 as a predictor of concurrent need satisfaction yielded an acceptable fit (Table 1). Perceived parental autonomy support related positively to need satisfaction at T1 ($\beta = .40$, $p = .001$) which, in turn, related to self-endorsed motivation at T1 ($\beta = .52$, $p < .001$). When adding a direct path between parental autonomy support and self-endorsed motivation at T1, this path was not significant and was dropped again from the model.

Table 1

Fit Indices of All Tested Models

Model	χ^2 /*df*	CFI	SRMR	RMSEA
1 Psychological need satisfaction as fuel for self-endorsed motivation	0.66	1.00	0.04	0.00
2 Perceived parental AS	0.70	1.00	0.07	0.00
3 Perceived parental and staff AS	0.70	1.00	0.06	0.00
4 Perceived parental and fellow patients AS	1.07	0.99	0.09	0.03
5 Perceived parental, staff and fellow patients AS	0.84	1.00	0.07	0.00
6 Perceived fellow patients AS as mediator	0.86	1.00	0.07	0.00
7 Self-endorsed motivation as a predictor of BMI	0.57	1.00	0.06	0.00

Note. AS = Autonomy support; BMI = Body Mass Index. CFI = Comparative fit index; SRMR = Standardized root mean square residual; RMSEA = Root mean square error of approximation.

The indirect effect from perceived parental autonomy support to self-endorsed motivation at T1 via need satisfaction at T1 was significant (95% CI [0.07, 0.35]). Thus, parental autonomy support seems to contribute to higher levels of self-endorsed motivation at the start of therapy via need satisfaction. To examine in a more explorative fashion whether perceived parental autonomy support would contribute to need satisfaction and self-endorsed motivation for change during therapy, we allowed one by one direct paths from parental autonomy support to need satisfaction at T2 and self-endorsed motivation at T3. Yet, none of these were significant and thus were left out of the model. Similar to Model 1, self-endorsed motivation at T1 and T3 were unrelated, but need satisfaction at T2 was related significantly to self-endorsed motivation at T3.

Model 3 built on Model 2 by adding perceived autonomy support from the staff at T2 as a predictor of need satisfaction at T2 and was found to yield an acceptable fit (Table 1). The model is displayed graphically in Figure 2 (i.e., first-ordered regression coefficients). As can be noticed, perceived autonomy support from the staff members related positively to changes in need satisfaction, which, in turn, related positively to changes in self-endorsed motivation across treatment. A direct path from perceived staff autonomy support to self-endorsed motivation at T3 was added, but was again dropped due to being nonsignificant. Further, the indirect effect from staff member autonomy support to changes in self-endorsed motivation via changes in need satisfaction just fell short of significance (95% CI [20.05, 0.21]). All other paths (effect sizes and significance levels) were comparable to Model 2. Autonomy support from the staff thus relates to more need satisfaction which, in turn, relates to higher levels of self-endorsed motivation at the end of treatment.

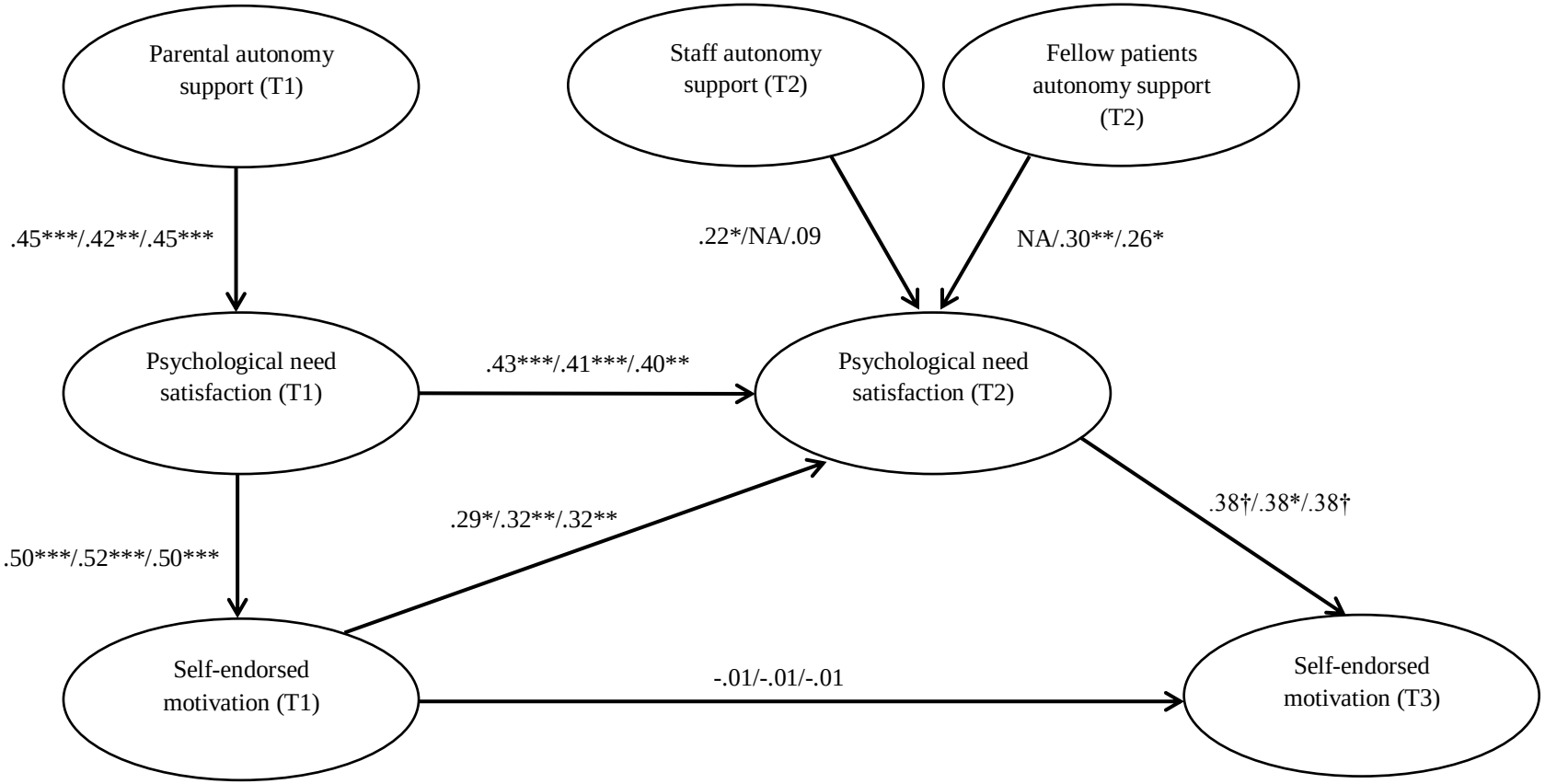

Figure 2. Structural Model depicting the Relation between Perceived Contextual Autonomy Support (from Parents, Staff, and Fellow Patients), Changes in Psychological Need Satisfaction and Changes in Self-endorsed Motivation across Therapy (i.e., Model 3, 4, and 5). Coefficients shown are standardized path coefficients in this order: Model 3/Model 4/Model 5. NA = Not applicable, this path was not taken up in that model. T = Time point. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

In Model 4 we replaced perceived staff autonomy support by perceived fellow patients autonomy support as a predictor of need satisfaction at T2. This model had an acceptable fit (Table 1). As graphically displayed in Figure 2 (i.e., second-ordered regression coefficients), autonomy support from the fellow patients related positively to changes in need satisfaction which, in turn, related significantly to changes in self-endorsed motivation. A direct path from perceived autonomy support from the fellow patients to self-endorsed motivation at T3 was also added, but was dropped again due to being non-significant. The indirect effect of fellow patients autonomy support to changes in self-endorsed motivation via changes in need satisfaction was marginally significant (90% CI [0.02, 0.26]). Again, all other paths were similar to the previous models (effect sizes and significance levels). Thus, autonomy support from the fellow patients related to self-endorsed motivation at the end of therapy via satisfaction of the needs.

Model 5 included all three sources of perceived autonomy support (i.e., parents, staff members, and fellow patients) and had a good fit to the data (Table 1). This model is graphically displayed in Figure 2 (i.e., third-ordered regression coefficients). First, as also seen in all the previous models, perceived parental autonomy support related positively to need satisfaction at T1, which, in turn, related to self-endorsed motivation at T1. In Model 3 and 4 we saw, respectively, that perceived autonomy support from the staff and perceived autonomy support from the fellow patients related positively to changes in need satisfaction, but in Model 5 (where both variables were entered together) this was only the case for autonomy support from the fellow patients. Apparently, only perceived autonomy support from the fellow patients had a unique effect on the satisfaction of the needs. Need satisfaction at T2 was again, after controlling for baseline levels in need satisfaction, positively related to self-endorsed change at T3 indicating more optimal motivation at the end of treatment for people whose needs got increasingly satisfied during the treatment.

In Model 5, perceived staff autonomy support was no longer related to need satisfaction when perceived fellow patients autonomy support was entered simultaneously in the model. Yet, staff members could still affect patients' motivation indirectly by creating a positive motivational climate in which patients adopt an autonomy-supportive approach towards each other. We tested this possibility in an additional, theoretically not anticipated, model. Specifically, we tested a mediation model with perceived fellow patients autonomy support intervening in the relation between perceived staff autonomy support and need satisfaction. This model (Model 6) yielded a good fit (Table 1) and is displayed in Figure 3. As shown, staff autonomy support related positively to fellow patients autonomy support, which, in turn, related to changes in need satisfaction. The indirect effect of staff autonomy support to changes in need satisfaction via fellow patients autonomy support was significant (95% CI [0.04, 0.30]). All other paths were similar to Model 5 (effect sizes and significance levels). With respect to the model comparison between Model 5 and 6, the AIC_c of the models indicated that Model 5 (AIC_c = 1003.74) was better than Model 6 (AIC_c = 1204.90) with respect to fit to the data and simplicity.

Aim 4: Self-Endorsed Motivation as a Predictor of BMI in Patients with Anorexia Nervosa. In Model 7, we looked at the relation between self-endorsed motivation at T3 and BMI at T3. Therefore, self-endorsed change at T3 was entered as a predictor of BMI at T3 while controlling for baseline levels of self-endorsed change and BMI. This model yielded an acceptable fit (Table 1). As depicted in Figure 4, increases in self-endorsed motivation T3 related positively to increases in BMI from T1 to T3.

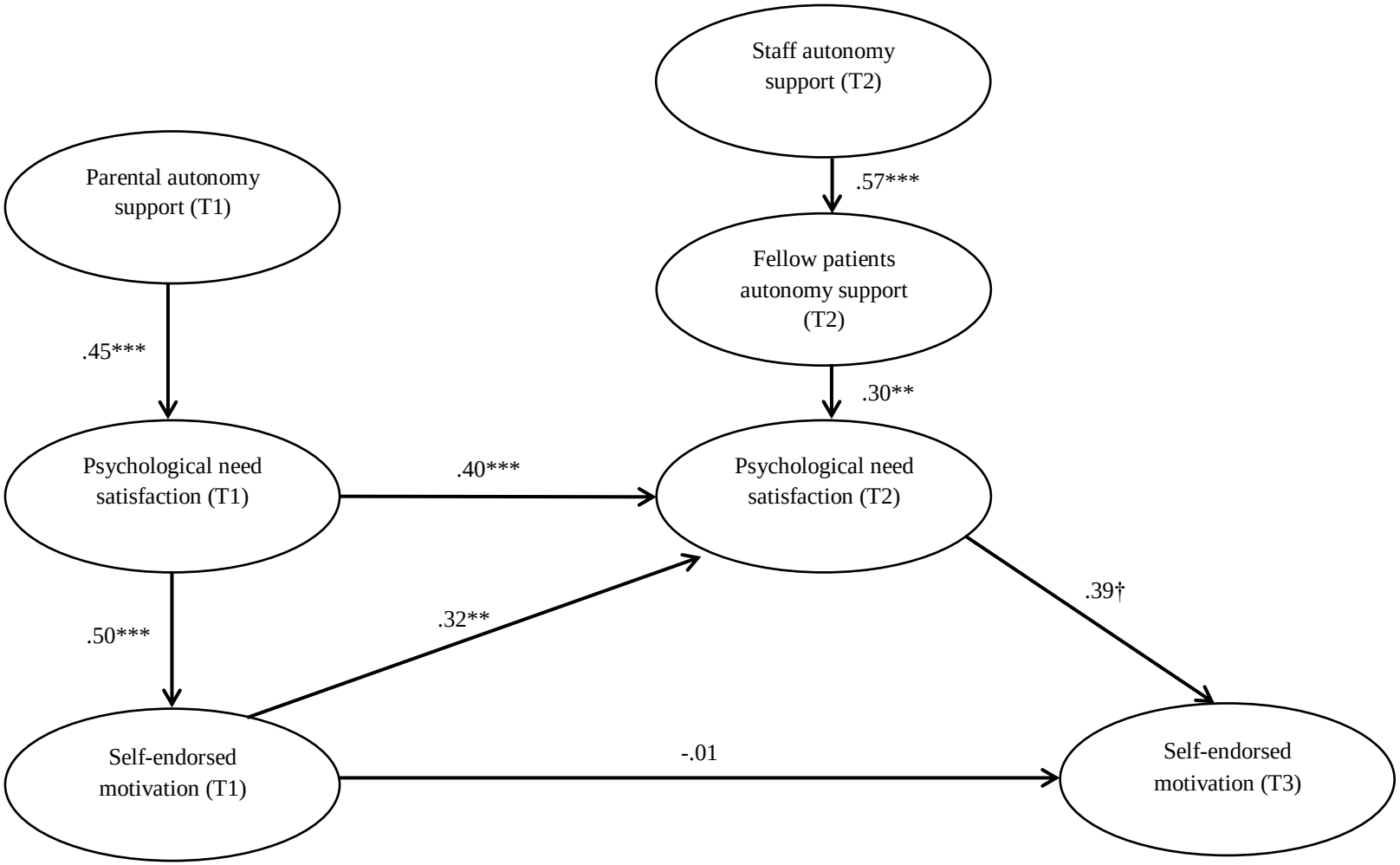

Figure 3. Structural Model depicting the Mediating Role of Fellow Patients Autonomy Support in the Relation between Staff Autonomy Support and Changes in Psychological Need Satisfaction (i.e., Model 6).

Coefficients shown are standardized path coefficients. T = Time point. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

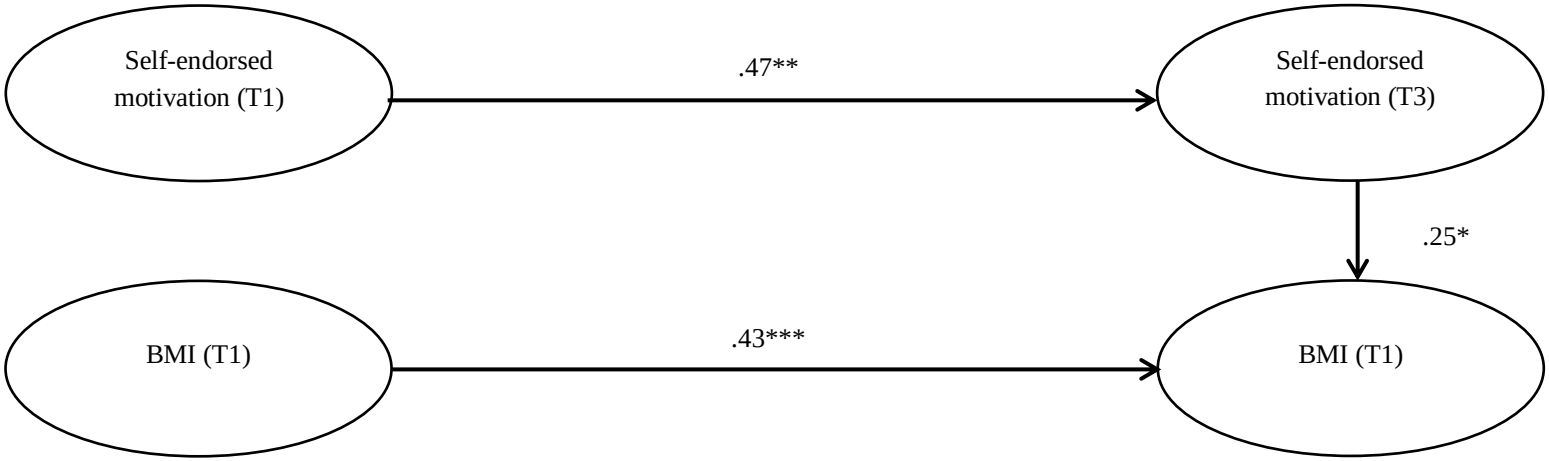

Figure 4. Structural Model depicting the Association between Changes in Self-endorsed Motivation and Body Mass Index across Therapy (i.e., Model 7).

T = Time point; BMI = Body Mass Index. *$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

The study of motivational dynamics in patients with eating disorders has attracted increasing attention over the past decade (Vansteenkiste et al., 2005). Motivation constitutes a critical issue as therapists often face patients who are ambivalent to change, with some patients being completely discouraged after repeated failures and others being reluctant to undertake any change at all (Ryan et al., 2011). While several motivational models have been introduced based on clinical expertise with patients with an eating disorder (Wollburg, Meyer, Osen, & Löwe, 2013), Vansteenkiste et al. (2005) argued that Self-Determination Theory (SDT; Deci & Ryan, 2000), a broad-band theory on human motivation and behavioral change, may help to shed a refreshing light on the way motivational dynamics can be conceptualized and motivation can be fostered in patients with an eating disorder. The present study aimed to add to the growing number of studies on the application of SDT in the field of eating disorders. Furthermore, it intended to shed more light on common factors in therapeutic change as the identification of these factors may also lead one to make adaptations to existing treatment program as to maximize voluntary change in patients with an eating disorders (Wollburg et al., 2013).

From the SDT-perspective, in order for people to engage in lasting change it is critical that patients gradually accept the reasons underlying change during therapy (Ryan & Deci, 2008), such that they leave therapy with an increased willingness to work on their eating problems. The present study revealed that patients reported an overall (i.e., mean-level) increase in self-endorsed reasons for change throughout the therapy which is in line with the previously mentioned studies by Allen et al. (2012) and Geller et al. (2005). Furthermore, relative increases in self-endorsed motivation related to increases in BMI in the group of patients with anorexia nervosa. This is in line with the study by Rieger et al. (2000) showing that self-endorsed motivation related to an increase in BMI in patients with anorexia nervosa.

Apart from documenting changes in self-endorsed motivation for change and BMI, the present study examined the mechanism underlying these changes. This is an important issue because, without insight into the driving forces of change, it is hard to provide advice to therapists about which therapeutic style to adopt during counseling. Within SDT, a pivotal role is assigned to the basic psychological needs for autonomy, competence, and relatedness to foster self-endorsed motivation. Consistent with our hypothesis about need satisfaction as the engine behind self-endorsed motivation, we found that satisfaction of patients' needs accounted for the move towards more self-endorsed motivation towards the end of therapy. Interestingly, need satisfaction not only contributed to changes in self-endorsed motivation, but patients entering therapy with a more self-endorsed motivation also derived greater need satisfaction from the therapy. Sheldon and Elliot (1999) found similar results in that people who pursued goals that are in concordance with whom they are, showed more persistence and experienced more success with respect to these goals, leading to more experienced need satisfaction. Patients' motivation at entrance can thus be seen as an important indicator of the degree to which these patients can benefit from treatment. Thus, this finding indicates that that some patients, that is, those entering with elevated levels of self-endorsed motivation, might be capable to proactively generate their own need-satisfying experiences such that they get involved in a positive change cycle.

Autonomy support provided by important others within the therapeutic context has received some attention in previous literature, although few studies dealt specifically with the treatment of eating disorders. Findings from these studies suggest that perceived autonomy support (mainly investigated as experienced from the therapist) is related to positive outcomes such as more need satisfaction (Silva et al., 2010) and higher levels of optimal motivation (Zuroff et al., 2007). Most studies, however, have not looked at these outcomes simultaneously, thus precluding an integrative investigation of the processes underlying the beneficial effects of perceived autonomy support. Findings from this study showed that perceived autonomy support has its beneficial effects on self-

endorsed motivation for change through satisfaction of the three psychological needs. In addition, a rather unique feature of the current study involved its examination of the role of different key figures in patients' lives in the process of fostering self-endorsed motivation. Specifically, apart from examining the role of staff members, we also examined the role of parents and fellow patients in stimulating a greater willingness to change in patients with an eating disorder.

Given the group-based treatment that was offered to the patients, we deemed it important to study the role of the staff and fellow patients. Although staff autonomy support related to changes in need satisfaction and subsequent changes in self-endorsed motivation when studied in isolation, this association fell below significance when the degree of experienced fellow patients autonomy support was controlled for. This is a remarkable and surprising finding, given that previous studies did demonstrate a significant and important role of staff autonomy support on patients' motivation to change (Zuroff et al., 2007).

Although future research needs to replicate the current findings, we want to add three thoughts. First, staff members might play a crucial role in stimulating self-endorsed motivation in patients at a more general level. For instance, they can create a therapeutic climate wherein patients themselves learn to adopt an autonomy-supportive attitude vis-a-vis each other. A supplementary mediation model (i.e., Model 6) in the current study provided support for such reasoning, although this model did not fit to the data as good as Model 5 and thus should be interpreted with caution. Alternatively, it might be the case that fellow patients have a stronger impact on patients' motivation because they have more common experiences. For instance, Swift and Dieppe (2005) suggest that sharing stories between fellow patients can be helpful, because hearing about feelings of other patients can give a patient the feeling that he/she is also allowed to feel these emotions. Finally, we need to highlight that perceptions of autonomy support concerned the entire staff. If patients had rated the degree of experienced

autonomy support with respect to their psychotherapist, perhaps, therapist autonomy support would have emerged as an unique predictor of need satisfaction and subsequent self-endorsed motivation.

Finally, our findings demonstrated that perceived parental autonomy support is concurrently associated with self-endorsed motivation via need satisfaction. Although parental autonomy support related indirectly to self-endorsed motivation at the onset of treatment, it did not relate to need satisfaction and motivation assessed at subsequent moments during therapy. This seems logical given that patients were hospitalized during treatment and had rather limited contact with their parents, relative to staff members and fellow patients. It could be the case, however, that parents play an essential role during ambulant treatment and again when patients return home after treatment.

Practical Implications

The current findings show that motivation is a dynamic process, which can be promoted through an autonomy-supportive approach. Furthermore, this autonomy support can originate from the therapists as well as from the fellow patients. Although there are similarities in the way these two social sources can be autonomy supportive, for example by being open and empathic to the thoughts and feelings of the patient, there are some special issues associated with each specific source of autonomy support that we would like to elaborate on. First, fellow patients can play differential roles with respect to the need satisfaction of patients. They can be autonomy supportive and strengthen each other in the process of change, but they can also be controlling by, for example, not tolerating the feelings of another patient or by conveying criticism and disappointment towards a patient who has not lived up to their standards. Within group therapy, therefore, it is important that an autonomy-supportive climate is created (by the staff members) wherein the relationship between patients can be stimulated to reflect openness and respect for each other's choices to ensure a need-satisfying context for patients.

Second, we would also like to elaborate on the role of staff members in creating an autonomy-supportive climate. Often the concept of autonomy support as proposed by SDT is confused with

supporting independence (Vansteenkiste, Williams, & Resnicow, 2012). However, the intention of an autonomy-supportive therapeutic context is not to foster independent functioning of the patient. Indeed, patients often need a lot of guidance and show dependence on the caregiver. What is important is that a patient feels that she is the one who wants to change, that she endorses the values and behaviors that are promoted within therapy and that she takes ownership in this change process. Thus, providing autonomy support and structure (i.e., guidance) go hand in hand. Such an autonomy-supportive attitude can be perfectly integrated within current evidence-based treatments, like Cognitive Behavioral Therapy (CBT), because the way (e.g., an autonomy-supportive way) in which values and behavioral regulations (e.g., cognitive restructuring) from such treatments are being brought to the patient plays a significant role in determining the outcomes of therapy via the effect this has on motivation. As shown by Zuroff et al. (2007) in a population of depressed patients, autonomy support and autonomous motivation are beneficial across different treatments and can be considered as common or nonspecific factors in treatment (Geller, 2002). Although more research is needed, there is little reason to expect that the critical role of autonomy support and need satisfaction as observed in the current inpatient group would not generalize to outpatient treatment. Yet, the role played by different authority figures may change somewhat as parents may have a stronger continuous impact when their daughters are at home. Also, the manifestation of autonomy support in group dynamics might be different from how an individual therapist approaches patients during inpatient treatment on a one-to-one basis.

Finally, the present results also provide more insight into the role of the parents. Parents can provide autonomy support to their children and this fosters a more self-endorsed motivation. It is, therefore, important to make parents aware of their crucial role and to stimulate autonomy-supportive parent-child communication during treatment.

Limitations and Future Research Directions

There were several limitations of this study. First, the sample size was relatively small thus restricting the power of our analyses. Second, although the assessment of constructs at multiple moments during therapy was a strength, the substantial dropout, mainly at Time 3, was unfortunate. These missing data were, however, missing completely at random and were estimated reliably using appropriate and state-of-the-art procedures. A third limitation was the sole use of self-report measures. Especially with the assessment of autonomy support, future studies could also investigate this construct more objectively by, for example, asking staff members to report on the autonomy support provided by them or their colleague or by videotaping and coding interactions between staff members and patients or between fellow patients. In addition, several of the self-report measures were modifications of existing questionnaires. Although the internal consistency and convergent validity of the measures in this study was adequate, further research is needed to address the psychometric properties of these scales, including test-retest reliability. Furthermore, the measure of self-endorsed motivation that was used in the present study addressed patients' eating problems in a broad manner. Future studies could look into motivation for changing specific eating problems. Although subsample 1 consisted of patients with different eating disorder diagnoses, due to the small sample size we were unable to test whether the proposed integrative model differed between different groups of patients. Hence, future research with more extensive samples may examine whether our model is equally applicable across patients with different eating disorders. Lastly, we only investigated processes at the start and during treatment. It would have been interesting, however, to look at the development of need satisfaction and motivation following treatment to see whether autonomy support experienced during treatment has long-lasting effects on these two motivational processes.

Conclusion

In summary, this study contributed to the understanding of motivational dynamics during therapy in patients with an eating disorder. It illustrated the crucial role of parents, staff members of the therapeutic setting, and fellow patients in fostering change. By providing autonomy support, these important figures in patients' lives foster need satisfaction and, ultimately, self-endorsed motivation to change. The results thus point to the importance of establishing an autonomy- supportive climate during residential group therapy. Given the promising results obtained in the current study, future research may further address the role of autonomy support in the treatment of eating disorders so as to enhance the effectiveness of treatment and facilitate long-lasting change.

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Appendix: *Descriptives, Internal Consistencies and Correlations between the Study Variables in Subsample 1*

	1	2	3	4	5	6	7	8	9	10
Time 1										
1. Perceived parental AS	.81									
2. Psychological need satisfaction	.39**	.85								
3. Self-endorsed motivation	.33**	.52**	.83							
4. BMI	.03	.15	.20	_						
Time 2										
5. Perceived staff AS	.18	.26*	.12	.41**	.83					
6. Perceived fellow patients AS	-.06	.29**	.08	.33**	.59**	.80				
7. Psychological need satisfaction	.33**	.62**	.56**	.29*	.37**	.43**	.88			
8. Self-endorsed motivation	.18	.45**	.70**	.21†	.36**	.43**	.73**	.83		
Time 3										
9. Self-endorsed motivation	.30**	.26*	.33**	.11	.15	.04	.37**	.37**	.83	
10. BMI	.29*	.21†	.22†	.54**	.61**	.29*	.46**	.39**	.30*	_
M	1.37	3.72	18.84	14.52	1.11	1.25	3.87	20.78	23.00	18.11
SD	1.53	.73	13.75	1.93	1.25	1.21	.68	12.56	11.30	2.29

Note. Internal consistencies are displayed on the diagonal. AS = Autonomy support; BMI = Body Mass Index. *M* = Mean; SD = Standard deviation.

†$p < .10$. *$p < .05$. **$p < .01$.

Choosing when Choices are Limited:

The Role of Perceived Afforded Choice and Autonomy in Prisoners' Well-being[1]

Although prison life is generally characterized by little choice and autonomy, there exists considerable variation in the number and type of choices offered to different prisoners. Drawing on Self-Determination Theory, which maintains that perceived afforded choice and autonomy are of crucial importance for individuals' psychological functioning, we investigated the relation between choice, autonomy satisfaction, and subjective quality of life among prisoners. We drew on quantitative cross-sectional data gathered among 156 Belgian prisoners (*M*age = 38.60; 88.5% men). Participants filled out questionnaires measuring perceived afforded choice, autonomy satisfaction, and quality of life. The main hypotheses were tested using structural equation modeling. Perceived afforded choice related to higher subjective quality of life within prison. This relation was partially accounted for by elevated levels of autonomy satisfaction. Supplementary analyses revealed that the benefit of choice emerged regardless of participants' valuation of choice, and that perceived afforded choice with regard to daytime activities (i.e., leisure activities, work, and education) yielded the strongest effect. Enhancing perceived afforded choice and autonomy satisfaction may provide important avenues for promoting prisoner quality of life. These findings are discussed in light of the growing focus on strength-based approaches and psychological well-being within the prison context.

[1] Van der Kaap-Deeder, J., Audenaert, E., Vandevelde, S., Soenens, B., Van Mastrigt, S., Mabbe, E., & Vansteenkiste, M. (in revision). Choosing when choices are limited: The role of perceived afforded choice and autonomy in prisoners' well-being. *Manuscript revised for Law and Human Behavior.*

Introduction

Prisoners generally experience relatively low levels of well-being and high rates of psychopathology compared to non-detained individuals (e.g., Boothby & Durham, 1999; Diamond, Wang, Holzer, Thomas, & Cruser, 2001; Green, Miranda, Daroowalla, & Siddique, 2005). Although reduced psychological well-being may predate imprisonment for many individuals (Adams, 1983), research also points to the detrimental effects of incarceration itself (Haney, 2001, 2006; Liebling, 2011; Paulus, Cox, McCain, & Chandler, 1975). It is important to study well-being and its antecedents in prisoners because, in addition to its demonstrated relation with prison suicide and other negative outcomes during incarceration (Liebling & Ludlow, 2016), there is also preliminary evidence among forensic psychiatric outpatients that subjective well-being may be negatively related to re-offending (Bouman, Schene, & de Ruiter, 2009). Strengthening prisoners' well-being may thus represent a route to reducing recidivism. Given the potential importance of prisoners' well-being and guided by strength-based theories (Ward & Brown, 2004), the literature has witnessed an increased interest in identifying the contextual and personal factors involved in prisoners' well-being (e.g., Crewe, Liebling, & Hully, 2011).

The emerging research on prisoners' well-being has successfully identified several individual and institutional factors that can buffer decreases in prisoners' well-being. In a recent review, Picken (2012) found that emotion-focused coping, receiving visits, engagement in structured activities within prison, and less fear of victimization all related to better adjustment and well-being among male prisoners. Similarly, recently released prisoners who perceived the prison environment to be threatening, hostile, and coercive were found to report more posttraumatic cognitions and symptoms, while an opposite pattern of results was found with regard to perceived social support (Listwan, Colvin, Hanley, & Flannery, 2010). Although an increasing number of factors promoting prison well-being have been identified, the potentially important roles of autonomy and perceived afforded choice have received little attention, possibly because individuals are believed to experience little autonomy in

prison. Indeed, imprisonment, by its very definition, restricts an individual's liberty and the inherent power inequalities present within prison settings (Bosworth & Carrabine, 2001; Crewe, Liebling, & Hulley, 2015), might be expected to further limit prisoners' sense of choice and autonomy. As outlined below, both theoretical accounts (Ryan & Deci, 2000) and testimonies of prisoners (Ashkar & Kenny, 2008) highlight the importance of perceived choice and autonomy for well-being. Limitation of these may thus come at a psychological cost for many prisoners. Even within the restrictive context of prison, however, there is likely to be considerable variation in the perceived degree of choice and autonomy experienced by individual inmates. In the current study we therefore examined the relations between perceived afforded choice, autonomy, and quality of life among Belgian prisoners.

Psychological Freedom within Prison Walls

In this contribution, we draw upon Self-Determination Theory (SDT), a broad theory on human motivation and socialization (Deci & Ryan, 2000; Vansteenkiste, Niemiec, & Soenens, 2010). Within SDT, autonomy is, together with competence and relatedness, conceived as a fundamental and universal psychological need, the satisfaction of which is conducive to individuals' well-being and quality of life. The need for autonomy denotes the experience of a sense of volition, psychological freedom, and self-endorsement when carrying out an activity. Satisfaction of this need in the prison context is apparent, for example, when prisoners willingly conform to prison rules or when they feel free to voice their irritation vis-à-vis prison staff. In contrast, autonomy frustration is characterized by feelings of pressure and inner conflict, for instance, when prisoners feel forced to take part in non-valued activities.

An extensive body of empirical work underscores the benefits associated with autonomy satisfaction and the mental health costs associated with autonomy frustration (for an overview see Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). To illustrate, in an earlier study, Vansteenkiste, Lens, Soenens, and Luyckx (2006) reported that in a sample of Chinese immigrants autonomy satisfaction related positively to positive affect, life satisfaction and vitality, while being negatively related to

depressive symptoms. More recently, Chen et al. (2015) showed in a large-scale study comprising college students from four culturally diverse countries (i.e., Belgium, China, Peru, and USA) that autonomy satisfaction related positively to life satisfaction and vitality, while autonomy frustration related to depressive symptoms (see Longo, Gunz, Curtis, & Farsides, 2016). Notably, these effects were similar across all four countries, underscoring the universality claim of SDT. The beneficial effects of autonomy satisfaction have not only been observed at the general level, but also at the domain-level (e.g., work, school, and sports) (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). For example, Adie, Duda, and Ntoumanis (2008) found that autonomy satisfaction among sport participants related to greater vitality when engaging in sport, specifically. Although numerous studies within the SDT-framework employing both between-person (e.g., Ng, Lonsdale, & Hodge, 2011) as well as within-person (e.g., Ryan, Bernstein, & Brown, 2010) designs have indicated the beneficial effects of autonomy, studies concerning autonomy among prisoners are scarce.

From a theoretical perspective, many scholars have pointed to the autonomy-restrictive nature of prison and the need to acknowledge prisoners' autonomy (e.g., Goffman, 1961; Sykes, 1958). For example, Andorno, Shaw, and Elger (2015) recently argued that prisoners should be allowed to make autonomous health care decisions. While, to the best of our knowledge, no SDT-based studies on the need for autonomy in the prison context have been carried out, a small number of studies provide indirect evidence for the potential importance of prisoners' perceived autonomy for well-being. It should be noted, however, that the definitions and operationalizations of autonomy in these studies are often less specific than the notion of autonomy as defined in SDT. For example, Windzio (2006) reported that male juvenile offenders felt moderately restricted in their autonomy, with autonomy being defined fairly broadly and referring to perceived loss of control, a sense of having too many restrictions, and experiencing depersonalization and infantilization. In a more direct examination of the role of autonomy in well-being, Ashkar and Kenny (2008) found, via semi-structured interviews, that detained adolescent males experienced incarceration as autonomy-reducing and that this lack of

autonomy engendered negative feelings. Given the limited number of studies on autonomy among prisoners, we sought to examine whether prisoners' experience of volition and psychological freedom during detention predicts their quality of life.

The Role of Contextual Affordance of Choice in Autonomy

As theory and (preliminary) research has highlighted the importance of autonomy for prisoners' well-being, a natural next step is to examine what conditions facilitate feelings of autonomy. In SDT, the provision of choice is considered one important pathway through which social contexts can facilitate satisfaction of the need for autonomy and subsequent well-being (Ryan & Deci, 2000). When provided with choices in their environment, people have the opportunity to select a course of action that best fits their interests, preferences, and values. When activities are better aligned with personal preferences and values, people are more likely to experience a sense of self-endorsement, volition, and psychological freedom (i.e., autonomy satisfaction). Thus, prisoners who perceive higher levels of afforded choice within prison (e.g., regarding leisure and other activities) are expected to feel more volitional during their daily activities.

Although effects of afforded choice can be complex and depend on a number of factors (e.g., the type of choice, personal characteristics, and cultural background), multiple studies have shown that choice, on average, has a beneficial effect on motivational outcomes such as intrinsic motivation, effort, task performance, and perceived competence (see Patall, Cooper, & Robinson, 2008 for an overview). A smaller number of studies have found beneficial effects of choice on individuals' well-being (e.g., Meng & Ma, 2015; Quine, Wells, de Vaus, & Kendig, 2007). Conversely, experiencing a lack of choice has been found to relate to maladjustment, including emotional stress, physical strain, and decreased health (Schulz, Beach, Cook, Martire, Tomlinson, & Monin, 2012).

Having a sense of choice may be particularly important in autonomy-restrictive settings, where afforded choice can increase individuals' rather limited sense of autonomy. In a now-classic study, Langer and Rodin (1976) experimentally examined the role of afforded choice in an autonomy-

restrictive context, namely among nursing home residents. Residents who were allowed to make choices (e.g., if and when they wanted to attend a movie and how to take care of a plant) displayed more happiness, alertness, and active participation compared to residents who were not provided with choices. Similarly, Kasser and Ryan (1999) reported that perceived autonomy support by nursing home residents contributed to more autonomous functioning, with the latter relating to greater well-being and a decreased mortality-risk one year later (see also Vallerand, O'Conner, & Blais, 1989).

As was the case with autonomy, few studies have addressed the role of perceived afforded choice in the prison context. A number of scholars note that opportunities for choice are very limited within prison (e.g., Crewe, Liebling, & Hulley, 2014; Goffman, 1961; Sykes, 1958), and that even when several options are available, these options may all be seen as undesirable or personally unimportant (see Goodstein, MacKenzie, & Shotland, 1984). For instance, prisoners often have limited choices about what to eat, which activities to undertake, daily schedules, and with whom to interact. Despite this theoretical recognition of the potential importance of choice in a prison context, few studies have empirically investigated the perceived affordance of choice among inmates. In one of the few studies to do so, Woodall, Dixey, and South (2014) found that prisoners appreciated choice and considered it to be adaptive, while a lack of choice engendered feelings of anxiety and frustration. In addition, some prisoners recognized that prison offered them options they did not have access to before imprisonment (e.g., education and health care). In this sense, prison appeared to both restrict, and afford, choice for some individuals.

Other indirect evidence for the potential beneficial effects of contextual affordance of choice comes from research focusing on juvenile delinquents' perceptions of their living group as being open or more repressive (e.g., Van der Helm, Beunk, Stams, & Van der Laan, 2014). Juvenile delinquents' perception of an open living group is partially dependent upon available opportunities to choose. To the extent juvenile delinquents perceived their living group as more open, they reported more active coping, greater treatment motivation, and less aggression, while a perceived repressive living group

climate related to passive coping (Van der Helm et al., 2014; Van der Helm, Stams, Van Genabeek, & Van der Laan, 2012). Because afforded choice is only one element distinguishing open from repressive group climate, it is unclear to what extent the benefits associated with an open climate are specifically due to perceived contextual affordance of choice as such. The scarcity and ambiguity of the current evidence highlights the need for more detailed work in this area.

Therefore, in addition to exploring how perceived afforded choice, in general, relates to autonomy satisfaction and subjective well-being we also considered two additional issues related to choice. First, in order to examine whether the benefits of perceived choice could be generalized to all prisoners, we investigated the role of the personal valuation of choice. One might wonder whether the presumed benefits of afforded choice on autonomy are limited to those prisoners who value choice or, stated differently, whether these effects are absent among prisoners who do not care about or who do not value making choices. Indeed, reasoning from a dispositional motives perspective, it could be argued that especially individuals with a strong preference for choice may benefit from potentially autonomy-enhancing conditions and experiences (Schultheiss, 2008; Schüler, Sheldon, Prentice, & Halusic, 2016). The more extreme interpretation of this perspective would even suggest that benefits of perceived choice in terms of autonomy need satisfaction and well-being are confined to those attaching importance to choice, while not surfacing for those who devalue choice. However, from the perspective of SDT, such individual differences in the valuation of choice would have no or only a minimal moderating role, as autonomy is seen as a universal nutriment for people's quality of life, with perceived afforded choice nurturing its satisfaction (Deci & Ryan, 2000). Thus, on the basis of SDT everyone is expected to benefit from perceived choice. Still, SDT does recognize that people may differ somewhat in the degree to which they reap the benefits of the provision of choice (Soenens, Vansteenkiste, & Van Petegem, 2015). In statistical terms, this means that, although the strength of the association between perceived afforded choice and the outcomes may differ between people depending on their valuation of choice (resulting in an ordinal interaction), it is unlikely that the association would

be absent among people who devalue choice, let alone that it would be reversed among these people (resulting in a disordinal interaction). Although no previous study has examined the possible moderating role of choice valuation in the relation between perceived choice and autonomy satisfaction, available studies on the moderating role of autonomy valuation have found inconsistent results (Chen et al., 2015; Schüler et al., 2016).

Second, to gain insight into the types of afforded choice that relate to autonomy and well-being, we also examined – in a more explorative way – whether the benefits of perceived afforded choice would depend upon the type of activity the choice related to. In doing so we differentiated between four general domains of prison life, that is, choice with respect to the execution of daytime activities (e.g., how to spend leisure time), social interaction (e.g., when to make phone calls), physical needs (e.g., when to shower), and religion (e.g., whether or not to take part in religious activities). By examining associations of contextual provision of choice with autonomy satisfaction and well-being within each of these four domains, we aimed to gain knowledge about which type of choice is most essential to prisoners' adjustment. Clearly, this knowledge has practical relevance because it may inform policy and structural measures attempting to increase prisoners' well-being through the provision of particular types of choice.

The Present Study

Although afforded choice and autonomy are unavoidably restricted in a prison environment, we argue that perceived possibilities for choice and experiences of autonomy are important for individuals' well-being even within this context. The overall goal of the present study was to investigate whether perceived afforded choice and autonomy satisfaction are related positively to prisoners' quality of life. Specifically, using a sample of Belgian prisoners, we investigated three theory-driven hypotheses and one exploratory research question. First, on the basis of SDT, we expected that autonomy satisfaction would be positively related to quality of life (Hypothesis 1). Second, we expected that perceived

afforded choice would be positively related to quality of life through heightened levels of autonomy satisfaction (i.e., mediation; Hypothesis 2). Third, based on SDT we expected that the relation between perceived afforded choice and autonomy or quality of life would be positive, regardless of whether prisoners valued choice or not (Hypothesis 3). Finally, in an explorative way, we aimed to examine whether perceived afforded choice in some domains would be related more strongly to autonomy satisfaction and quality of life than in others.

Method

Participants

Participants were mostly male (88.5%) and were on average 38.60 years old (*SD* = 11.68). Compared to the general population of Belgian prisoners, this sample consisted of slightly fewer males (95.6% in the general population; Justice Federal Public Services, 2015) and relatively old prisoners (in 2010, 52% of Belgian prisoners were between 21 and 35 years old; Van Malderen, Pauwels, Walthoff-Borm, Glibert, & Todts, 2011). The majority of the participants were Belgian nationals (86.0%), a relatively high percentage compared to the general Belgian prison population (55%; Justice Federal Public Services, 2015). Most participants were currently single (38.9%) or had been living with a partner before their detention (26.8%). Additionally, most participants (59.9%) had at least one child. The highest level of education obtained was 10.2% primary school, 72.0% high school, and 15.9% higher education, whereas 1.3% had not completed any education. Marital status, parental status, and educational level were all in line with previous descriptions of the general population of Belgian prisoners (Vanhaegendoren, Lenaers, & Valgaeren, 2001).

With regard to participants' sentence status, in this sample 65.0% were convicted of a crime, 26.1% were accused (but not yet convicted), and 8.3% were interned[2] (vs. 58.5%, 31.7%, and 8.2%,

[2] Under Belgian Law, mentally ill offenders, who are regarded not to be responsible for their crime due to their psychiatric disorder, can be interned. Rather than being a punishment, internment is a safety measure which excludes mentally ill offenders from society (to prevent further harm) while also providing treatment (see also

respectively, in the general prison population; Justice Federal Public Services, 2015). On average, participants had spent (of the current imprisonment) 25.46 months (*SD* = 34.77; range = 0.75 - 232 months) in prison. Of the convicted participants, the average sentence was about 7 years (*M* = 82.76 months; *SD* = 76.20; range = 1 - 360 months). Finally, with regard to previous incarceration, 42.0% had been in prison before (vs. 55.4% in the general population; Vanhaegendoren et al., 2001).

We also inquired prisoners about the reason for their imprisonment. The following crimes were reported: 50 (32.1%) crimes of violence; 29 (18.6%) drug-related crimes, 15 (9.6%) crimes of property, 24 (15.4%) other type of crimes (e.g., distribution of child pornography) and 35 (22.4%) of the prisoners were detained because of multiple crimes (for 3 participants this information was missing). The relatively long average sentence length and high frequency of serious crimes in the current sample likely reflects the tendency in Belgian sentencing policy to assign individuals sentenced to three years or less, to electronic monitoring instead of detention in prison ("Elektronische toezicht als", 2016).

Procedure

The study was conducted between December 2014 and March 2016 in seven prisons within Flanders (the Dutch-speaking part of Belgium). Once approval for this study was obtained from the Federal Public Service of Justice and the ethical committee of *XXXX (blinded for review)* University (no. 2014/38), we contacted and informed the directorial board of each prison via e-mail and phone concerning the study objectives and methodology. Subsequent practical arrangements were discussed and made with each of the prison's internal contact person. All prisoners were informed about the study through a flyer describing the main goal of the study (gaining insight in prisoners' well-being) and the procedure. On this flyer, prisoners could indicate whether and when they wanted to participate. Flyers were distributed and collected via the prison's internal mailing system. Based on this information, a schedule was made for the individual testing of each prisoner who wanted to participate in this study. Subsequently, participants who were willing to participate but who were deemed to be too dangerous

Vandevelde, Soyez, Vander Beken, De Smet, Boers, & Broekaert, 2011 for an overview of internment in Belgium). However, many mentally ill offenders remain in prison without receiving treatment.

by the directorial board, who had a sanction (e.g., solitary confinement) at the time of the assessment, or had insufficient Dutch language skills, were excluded from participation.

The questionnaires were first pilot-tested among two prisoners to ensure that all items were clear and understandable. Based on this pilot test, we made a few minor changes to some of the items (e.g., prisoners preferred a Likert scale instead of a Visual Analogue Scale). All questionnaires were filled out individually in a private room within the prison, under the supervision of the second author. Participants first received an information letter concerning the study aims and procedure, which were, subsequently, also explained orally. Participants were informed that participation was completely voluntary and anonymous, and that they could cease their participation at any moment. Participants did not receive any financial compensation. Participants then filled out an informed consent. This was followed by a paper-and-pencil administration of the questionnaires during which time the participant was welcome to ask questions. As seven participants experienced difficulties in reading the questionnaires, these were read aloud to them. After completing the questionnaire, participants received a debriefing (both orally and in writing) in which the study aims were explained in more detail.

Measures

Background Variables. We assessed several background variables including age, gender, nationality, education, marital status, and parental status (i.e., having a child or not). In addition, a number of variables related to the prison regime and participants' incarceration history were coded including the prison (one of the seven prisons), sentencing status (i.e., accused; convicted; interned), prison regime (i.e., open; halfopen; closed), time spent in prison, sentence length (for those who were convicted), previous imprisonment, and reason for current imprisonment. Reason for imprisonment was reported by the prisoners and was later coded based on a subscale of the European Addiction Severity Index- Treatment Demand Indicator (EuropASI-TDI; Kokkevi, Hartgers, Blanken, Fahner, Tempesta, & Uchtenhagen, 1993; McLellan, Luborsky, O'Brien, & Woody, 1980), a standardized screening measurement mainly used in individuals with substance-use related problems. The following

categories were coded: possession or trafficking of illegal drugs; crimes of property such as burglary, theft/shoplifting, fraud, forgery, extortion, and trading in or distributing stolen goods; crimes of violence such as battery, robbery, arson, sexual assault, rape, manslaughter, and murder; other crimes (e.g., distribution of child pornography, prostitution, stalking); and, finally, multiple crimes.

Perceived Afforded Choice. The degree to which participants experienced afforded choice was assessed in eight domains, categorized into four general types: (1) daytime activities (domains: leisure activities, work, education); (2) social networking (domains: receiving visits, making phone calls); (3) physical needs (domains: eating; taking a shower); and (4) religious beliefs (domain: religion/spirituality). These domains were chosen based on consultation with one of the prisons' Psychosocial Service and on previous empirical studies showing the importance of daytime activities (e.g., Tuastad & O'Grady, 2013), social networking (e.g., Cochran, 2014), physical needs (Vanhouche, 2015), and religious beliefs (e.g., Maitland & Sluder, 1996) for prisoners' well-being. Within each of the aforementioned domains, two questions were asked pertaining to the degree of choice (e.g., "I experience a sense of choice concerning whether or not I am allowed to participate in a leisure activity (for example, sports)"). Items were rated on a 5-point Likert scale ranging from 1 (*no choice*) to 5 (*a lot of choice*). Besides the domain-specific afforded choice scores, we averaged participants' responses across the eight domains. This scale had good reliability ($\alpha = .89$).

Choice Valuation. The degree to which participants valued choice was assessed in the eight domains as discussed above. Within each of these domains, participants rated the extent to which they valued making choices in a given domain (e.g., "I find it important to have choice in the domain of leisure activities (for example, sports)"). Items were rated on a 5-point Likert scale ranging from 1 (*not at all important*) to 5 (*very important*) and were summed to create an average score of choice valuation across the eight domains. This scale had good reliability ($\alpha = .70$).

Autonomy Satisfaction. We employed the Autonomy subscale of the Basic Psychological Need Satisfaction and Need Frustration scale (BPNSNF; Chen et al., 2015) to assess participants'

generally experienced level of autonomy satisfaction (4 items; e.g., "I experience a sense of freedom in the things I do") as well as frustration (4 items; e.g., "I feel forced to do many things that I actually do not want to do"). To ensure that the items would be understandable for all participants we used a simplified version (Van der Kaap-Deeder, Vansteenkiste, Soenens, Loeys, Mabbe, & Gargurevich, 2015). For example, "I feel I have been doing what really interests me" was changed into "What I do, really interests me". Items were rated on a 5-point Likert scale ranging from 1 (*not at all true*) to 5 (*completely true*). We reversely scored the 4 items assessing autonomy frustration and averaged these with the 4 items assessing autonomy satisfaction to obtain an aggregate score of autonomy satisfaction versus frustration, as has been done in previous research (e.g., Baard, Deci, & Ryan, 2004). For ease of presentation, we will refer to this score as a score for autonomy satisfaction. This scale was reliable (α = .86).

Quality of Life. The EUROHIS-QOL 8-item index (European Health Interview Survey - Quality of Life; Schmidt, Mühlan, & Power, 2006), a short measure derived from the World Health Organization - Quality of Life measures (i.e., WHOQOL-100 and the WHOQOL-BREF), was used to assess participants' quality of life, as has been done in a number of previous studies among prisoners (e.g., Zwemstra, Masthoff, Trompenaars, & De Vries, 2009). This scale represents quality of life in the psychological, physical, social and environmental domain. An example item is: "How would you rate your quality of life?". Items were rated on a 5-point Likert scale ranging from 1 (*very bad/ very unsatisfied/ not at all*) to 5 (*very good/ very satisfied/ completely*). Scores across the eight items were summed to create a general index of quality of life. This scale showed good reliability (α = .79).

Plan of Analyses

Basic descriptive and bivariate analyses were first carried out to get a sense of the frequencies and simple associations between the key variables of interest for the study. The main hypotheses were then examined with three structural path models using MPlus 7 (Muthén & Muthén, 1998-2012) with maximum-likelihood as an estimator. In the first model, we investigated the relation between autonomy

satisfaction and quality of life (cf. Hypothesis 1). In a second model, we added perceived afforded choice as a predictor of autonomy and quality of life, thereby investigating whether autonomy mediated the relation between perceived afforded choice and quality of life (cf. Hypothesis 2). In a third model, we examined whether the valuation of choice moderated the relation between afforded choice on the one hand and autonomy satisfaction and quality of life on the other (cf. Hypothesis 3). Only 0.17% of the data was missing. Little's (1988) MCAR test indicated that these missing data were missing completely at random, $\chi^2(5) = 6.76$, $p = .24$. The use of the full information maximum likelihood (FIML) procedure was therefore appropriate to estimate missing data (Schafer & Graham, 2002). As the estimated models were fully saturated, all models had a perfect fit (χ^2 (0) = 0.00). To test the significance of the indirect effect from perceived afforded choice to quality of life via autonomy satisfaction, we used bootstrapping (using 1,000 draws), a nonparametric resampling procedure that is currently recommended (Preacher & Hayes, 2008). Finally, we employed bivariate correlations to explore the relation between perceived afforded choice in each of the eight domains and the two outcome variables (i.e., autonomy and quality of life) (Research question 1).

Results

Descriptive Statistics and Preliminary Analyses

As displayed in Table 1, prisoners in general experienced moderate levels of perceived afforded choice, autonomy satisfaction and quality of life, whereas they greatly valued choice. With regard to the correlations, perceived afforded choice was positively related to autonomy satisfaction and quality of life, with the latter two also being positively interrelated. The valuation of choice, on the other hand, was unrelated to perceived afforded choice, autonomy satisfaction, and quality of life.

Table 1

Descriptives of and Correlations between the Study Variables

	M (*SD*)	1	2	3
1. Perceived afforded choice	3.14 (.79)	-		
2. Choice valuation	4.36 (.53)	.12	-	
3. Autonomy satisfaction	3.10 (.87)	.24**	.03	-
4. Quality of life	3.26 (.71)	.31***	.04	.31***

Note. $^{**}p < .01$. $^{***}p < .001$.

With respect to the background variables, results of an ANOVA indicated significant differences in perceived afforded choice ($F(6,149) = 3.80$, $p < .01$, $\eta^2 = .13$) between the prisons. There were also significant differences in perceived afforded choice depending on sentence status with accused prisoners ($M = 2.76$; $SD = .66$) experiencing significantly less choice than convicted ($M = 3.26$; $SD = .76$) prisoners, with this latter group not differing from the interned prisoners ($M = 3.30$; $SD = .92$) ($F(2,152) = 7.03$, $p < .01$, $\eta^2 = .09$). Further, as expected, prisoners in an open regime ($M = 3.51$; $SD = .84$) reported significantly more afforded choice than those in a closed regime ($M = 2.94$; $SD = .75$), while prisoners in the half open regime ($M = 3.23$; $SD = .71$) did not significantly differ from both other regimes ($F(2,153) = 7.10$, $p < .01$, $\eta^2 = .09$). There were no further significant relations between the background and the main study variables. Therefore, we did not control for the background variables in our main models.

Primary Analyses

Hypothesis 1 and 2: The Relation between Perceived Afforded Choice, Autonomy Satisfaction, and Quality of Life. In a first structural model, we investigated the relation between autonomy satisfaction and quality of life. Autonomy satisfaction was positively related with quality of life ($\beta = .31$, $p < .001$). In the second structural model, we built upon the first model by adding perceived afforded choice as a predictor of both autonomy satisfaction and quality of life. As displayed in Figure 1, perceived afforded choice was positively related with both autonomy satisfaction and quality of life. Similar to the first model, autonomy satisfaction related positively to quality of life. A bootstrapping procedure was used to test the significance of the indirect effect from perceived afforded choice to quality of life through autonomy satisfaction. This effect was found to be significant (95% CI [.012, .108]).

Hypothesis 3: The Moderating Role of Choice Valuation. In a third structural model, we examined whether the valuation of choice moderated the relation between perceived afforded choice

and autonomy satisfaction. Building upon the second model, we added the choice valuation and its interaction with perceived choice as predictors of autonomy satisfaction, which were both found to be non-significant (β = -.01 and β = -.04, *p*s > .05). Similarly, to investigate whether choice valuation moderated the relation between perceived afforded choice and quality of life, we added choice valuation and its interaction with perceived afforded choice to the second model. Both paths were non-significant (β = -.02 and β = -.07, *p*s > .05). In both of these models, the remaining paths were similar to the second structural model.

Research Question 1: Examining Domain-specific Afforded Choice. To gain further insight into the role of perceived afforded choice in the prediction of autonomy satisfaction and quality of life at the domain level, we broke the composite score of perceived afforded choice down into eight domains. Next, we employed bivariate correlations between perceived choice for each of the eight domains and these two outcome variables. As displayed in Table 2, especially perceived choice with regard to daytime activities (i.e., leisure activities, work, and education) related to higher levels of autonomy satisfaction and quality of life, whereas perceived choice in the domain of religion or spirituality related the least strongly to these outcomes. Perceived choice in the domain of social networking and physical needs related mostly to quality of life and to a lesser degree to autonomy satisfaction.

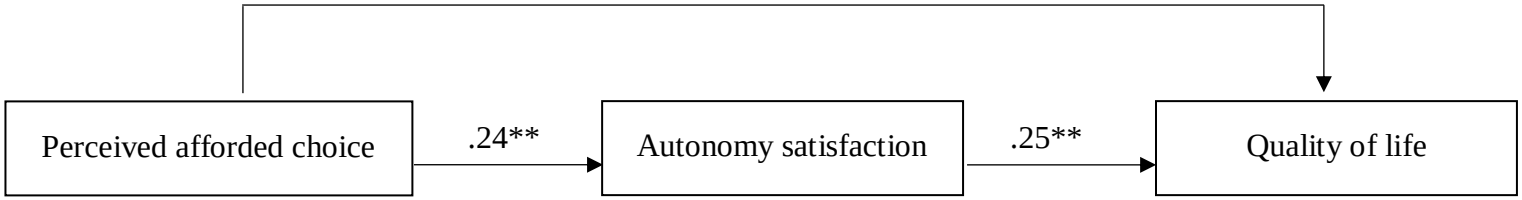

Figure 1. Structural Model Depicting the Relation between Perceived Afforded Choice, Autonomy Satisfaction, and Quality of Life.

*$p < .05$. **$p < .01$.

Table 2

Descriptives of Perceived Afforded Choice per Domain and Correlations with Autonomy Satisfaction and Quality of Life

Perceived afforded choice per domain	*M* (*SD*)	Autonomy satisfaction	Quality of life
Daytime activities			
1. Leisure activities	2.83 (1.11)	.16*	.35***
2. Work	2.99 (1.17)	.24**	.33***
3. Education	3.19 (1.01)	.22**	.15†
Social networking			
4. Visits	3.05 (1.15)	.20*	.22**
5. Phone calls	3.37 (1.05)	.10	.20*
Physical needs			
6. Eating	3.40 (1.17)	.08	.15†
7. Shower	3.05 (1.29)	.16*	.24**
Religious beliefs			
8. Religion/spirituality	3.17 (1.09)	.15†	.04

Note. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

According to the well-researched Self-Determination Theory (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013), satisfaction of the need for autonomy, which can be fostered through autonomy-supportive contexts, is regarded to be essential for individuals' well-being. Although many studies have indicated the beneficial effects of autonomy satisfaction (e.g., Chen et al., 2015) and of the perceived provision of choice (as a way of supporting the need for autonomy) (e.g., Quine et al., 2007) in non-prison contexts, no study to date has directly examined these constructs and their relation with quality of life amongst prisoners. As prisoners have been found to experience relatively low levels of well-being and high levels of psychopathology (Boothby & Durham, 1999; Green et al., 2005), identifying factors that may act to promote psychological health in this population is crucial. The aim of this study was to investigate the relations between Belgian prisoners' perceived choice provision, their quality of life, and the possible mediating role of autonomy satisfaction. A number of conclusions can be drawn from our findings.

First, in line with previous studies showing the beneficial effects of choice for individuals' well-being in other settings (Quine et al., 2007), and consistent with our first two hypotheses, we found that perceiving that one can make decisions in the prison context related positively to quality of life, an association which was partly explained by higher levels of autonomy satisfaction. As autonomy satisfaction was only found to be a partial mediator of the relation between perceived afforded choice and quality of life, future studies could examine other possible SDT-mediators such as competence and relatedness. Indeed, previous studies found that perceived choice related positively to competence (Patall et al., 2008), presumably because the offer of choice by socializing agents may signal the fact that one has confidence in the chooser to competently carry out activities or fulfill certain responsibilities.

Second, in relation to our third hypothesis, we found that the beneficial effects of perceived afforded choice were independent of the value attached to choice. This finding indicates that perception of afforded choice is conducive to individuals' autonomy and quality of life, even among individuals who indicate not valuing or even devaluing the importance of making independent choices. Such a finding is congruent with the SDT-based universalistic assumption that perceived contextual autonomy support (with offered choice being one of its markers) and the experience of autonomy satisfaction is beneficial to all of us (Deci & Ryan, 2000; Soenens et al., 2015). In this respect, our result is consistent with Chen's et al. (2015) findings which showed that individuals from four culturally diverse countries (i.e., Belgium, China, Peru, and USA) benefited from autonomy satisfaction, independent of the desire for and importance attached to the need for autonomy.

Third, perceived afforded choice was found to be most crucial in the domain of daytime activities (i.e., leisure activities, work, and education), which was related to greater autonomy satisfaction and a higher quality of life compared to choice in other domains. Presumably, these greater benefits are due to the fact that prisoners spend a substantial part of their time on these daytime activities (compared to the time spent in the other assessed domains) and, hence, being capable to make choices in these daily activities may play a more profound role in their overall well-being. In contrast to the importance of choice regarding daytime activities, perceived afforded choice in the domain of religion related the least strongly to our outcomes. This may be because other factors, such as an individual's dedication to religion, also likely influence the degree to which choice with respect to religious activities is beneficial. Finally, perceived afforded choice in the domains of social networking and physical needs related mostly to quality of life but little with autonomy satisfaction. Perhaps choice in these domains is more relevant for the other two psychological needs proposed within SDT (i.e., relatedness and competence). Being allowed to have some choice over the length or the frequency of

visits may, for instance, be especially beneficial for satisfying the need for relatedness, as it allows one to connect more strongly to other individuals.

Taken together, the current findings address the generalizability of the benefits of perceived afforded choice across prisoners' valuation of choice and the domain in which they are offered choice. While the benefits of afforded choice were found to be independent of individuals' choice valuation, afforded choice yielded more pronounced autonomy and well-being benefits in some domains compared to others. At first sight, this can be considered as conflicting evidence for the claimed generalizability of choice. Yet, we don't think the current findings are in contrast with one another. Although domain-specific choice did not relate positively to general autonomy and general well-being across all domains, it is possible that each of the domain-specific experience of afforded choice may be conducive to domain-specific autonomy and well-being, an issue we could not sort out in the present study due to the lack of domain-specific indicators of autonomy and well-being.

Two other findings deserve mention. First, in line with previous studies (e.g., Green et al., 2005; Windzio, 2006), we found that prisoners experienced only moderate levels of perceived afforded choice, autonomy satisfaction, and quality of life, whereas almost all prisoners expressed a moderate to high valuation of choice. Such high valuation of choice might have its origins in autonomy frustration, as such frustration has been found to stimulate desire for this specific need (Sheldon & Gunz, 2009). Either way, the fact that prisoners placed such high value on the right to choose indicates that this may be an important factor to take into account in prison programming.

Second, we found some interesting results with respect to our background variables. Within the broader literature on factors influencing prisoners' adaptation to and well-being in prison, a distinction is often made between deprivation factors (i.e., factors that are characteristic of current prison life, such as prison regime or number of prisoners per prison cell; Sykes, 1958; Sykes & Messinger, 1960) and importation factors (i.e., factors related to prisoners' experiences before their imprisonment and

prisoners' unique personal characteristics such as age and gender; Irwin & Cressey, 1962). Although we mainly focused on a deprivation factor (i.e., perceived afforded choice), we also examined relations between numerous background variables (mostly importation factors) and prisoners' level of perceived afforded choice and psychological functioning. Not surprisingly, we found that accused (vs. convicted) prisoners and prisoners serving in a closed (vs. open) regime experienced the least sense of choice. We also found significant differences between prisons in the perceived level of choice, which may reflect key institutional differences between them (e.g., the density of prisoners). These observed variations suggest that while some structural and institutional factors appear to hinder autonomy satisfaction, modification of these factors may also have the potential to improve prisoner quality of life.

Limitations and Future Studies

As the first study to empirically investigate perceived afforded choice and autonomy satisfaction in prisoners, we believe that this study provides important new insights regarding factors that contribute to promoting prisoner quality of life. However, future research would benefit from addressing some of the limitations of the current study. First, our sample was rather selective and homogenous as it consisted of relatively old prisoners (compared to the general Belgian prison population; Van Malderen et al., 2011), all of whom were Dutch-speaking. Moreover, as noted above, prisoners who were deemed to be too dangerous or who had a sanction were excluded from the present study, although these individuals might be especially vulnerable to a lack of perceived afforded choice and autonomy. Future studies with more heterogeneous samples are needed to explore the generalizability of the current findings. Such studies could also include more interned prisoners (who represented only a small portion of our sample), to shed light on this particularly vulnerable population within Belgian prisons (see also Vandevelde et al., 2011). Exploring cross-cultural variations in choice and autonomy satisfaction across different penal systems might also be valuable (see van Mastrigt, 2015, for a recent discussion of SDT and the notion of Scandinavian exceptionalism).

Another limitation of the current study was its exclusive focus on global quality of life as an indicator of well-being. Future research could usefully incorporate additional indicators of personal well-being, like life satisfaction and depressive symptoms, as well as more prison-specific measures of quality of life (e.g., Liebling's Measuring the Quality of Prison Life scale). Future investigation of interpersonal well-being would also be relevant, as choice (Langer & Rodin, 1976) and autonomy (Costa, Ntoumanis, & Bartholomew, 2015) have also previously been shown to be beneficial for social relationships. Additional research exploring choice domains other than those investigated here (e.g., interpersonal contact within prison) would also help to further clarify the relations between perceived afforded choice, autonomy satisfaction, and well-being identified in this study.

Another avenue for future research would be to carry out more fine-grained tests of the choice hypothesis. For example, previous studies in non-criminal justice contexts have pointed to the importance of providing choice in a need-supportive way (Moller, Deci, & Ryan, 2006; see Katz & Assor 2007, for an overview) and the need to adapt the complexity of choices to the cognitive capabilities of individuals (e.g., Iyengar & Lepper, 2000). Choices that are communicated in a controlling way (e.g., pressuring the individual to choose a specific alternative), may, in fact, do more harm than good (Patall et al., 2008). Exploring this possibility in the prison context, could provide important insights of value not only for the penal policy, but also for theoretical work on SDT, perceived afforded choice and autonomy satisfaction.

Finally, future research exploring contextual influences on autonomy satisfaction should also go beyond an examination of afforded choice, as the offer of choice represents just one pathway for prisoners to experience greater volition in detention. For example, Van der Laan and Eichelsheim (2013) showed in a sample of detained juvenile offenders that positive interactions with peers and staff, the perception of clear and fair rules, and a high quality of daily activities related to higher levels of autonomy (conceptualized as the perceived possibility to regulate own behavior and to complain about

rules). This study and others (see, for instance, Crewe et al., 2011) suggest that several features of the context are important for individuals' autonomy and that more insight is needed into the unique role and interplay between different features of an autonomy-supportive prison climate.

Theoretical and Practical Implications

Although this study was mainly based on a SDT framework, the current findings also accord well with the Good Lives Model for Offender Rehabilitation (GLM; Ward & Stewart, 2003). The GLM is a strengths-based rehabilitation model that focuses on both risk/recidivism reduction as well as on supporting offenders to live a 'good life' (Ward & Brown, 2004). In the GLM, human needs and the 'drive' for the acquisition of primary goods that stem from it (e.g., relatedness, inner peace, excellence in work, and creativity, amongst other) are fundamental, underscoring its natural fit with SDT (Ward & Brown, 2004). Purvis, Ward and Willis (2011, p. 14) describe the objective of the GLM as "*the promotion of primary goods, or human needs that, once met, enhance psychological well-being*". The fact that the GLM taps into these core aspirations and drives of offenders, hence leading them to being more motivated to change their life, explains its current popularity, as two objectives that at first sight do not seem to be compatible are integratively tackled: crime reduction/protection of society as well as the promotion of the offender's quality of life/well-being (Ward, Gannon & Fortune, 2015). Respect for the offender's autonomy and the other needs set forth in the SDT are quintessential in order to serve this dual goal. Efforts to draw more explicit links beween the GLM and SDT perspectives in future prisons research would likely be of benefit to both.

Our findings yield several important practical implications. In Flanders (Belgium), there is a 'Decree on the organization of care and services for prisoners' that states that in each prison, high-quality programs must be offered concerning culture, education, health, sports, vocational training, and well-being (Flemish Government, 2013). As our results show that all prisoners benefitted from perceived afforded choice, regardless of their personal preference for choice, prison policies that

enhance the provision of choice amongst such programs, particularly for daytime activites, may be useful in promoting prisoner quality of life. Brosens (2015) found that some prisoners do not take part in prison activities (e.g., sports), because such participation would mean that they would not have sufficient time for other personally relevant activities (e.g., going out for fresh air). Apart from being able to choose what to do (within reasonable limits), prisoners could also be offered more choice in the scheduling of their activities, which may possibly also lead to increased participation rates.

Conclusion

This study showed that the perceived affordance of choice (especially in the domain of daytime activities) related to higher levels of quality of life among prisoners, partly via elevated levels of autonomy satisfaction. These results were observed independent of prisoners' valuation of autonomy. These findings point to the universal importance of supporting the need for autonomy among prisoners.

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Are the Benefits of Autonomy Satisfaction and the Costs of Autonomy Frustration Dependent on Individuals' Autonomy Strength?[1]

From a Self-Determination Theory perspective, individuals are assumed to benefit and suffer from, respectively, the satisfaction and frustration of the psychological needs for autonomy, competence, and relatedness, regardless of interpersonal differences in the strength of these needs. Yet, previous studies on the moderating role of need strength in these relations are scarce, operationalized need strength differently, and provided inconsistent findings. In two cross-sectional studies among 224 South African adults (M_{age} = 24.13; SD_{age} = 4.25; 54.0% male) and 156 Belgian prisoners (M_{age} = 38.60; SD_{age} = 11.68; 88.5% male), we investigated the moderating role of autonomy strength (i.e., autonomy valuation and desire) in the relation between autonomy satisfaction and frustration on the one hand and well-being and ill-being on the other hand. Study 1 provided some evidence for the moderating role of especially explicit autonomy desire, although all participants benefitted from autonomy satisfaction and suffered from autonomy frustration. In Study 2, neither explicit nor implicit autonomy desire was found to play a consistent moderating role. Overall, these findings indicate that autonomy is conducive to individuals' well-being relatively regardless of their need strength, thereby providing further evidence for the universality claims made within Self-Determination Theory.

[1] Van Assche, J.[a], Van der Kaap-Deeder, J.[a], Audenaert, E., De Schryver, M., & Vansteenkiste, M. (2016). Are the benefits of autonomy satisfaction and the costs of autonomy frustration dependent on individuals' autonomy strength? *Manuscript submitted for publication.* [a] Shared first authorship.

Introduction

Self-Determination Theory (SDT; Ryan & Deci, 2000) is an organismic-dialectic meta-framework on human motivation, which maintains that three psychological needs serve as nutrients for individuals' psychological growth, integrity, and well-being. Specifically, as stated within Basic Psychological Need Theory (Vansteenkiste, Niemiec, & Soenens, 2010), one of the six mini-theories of SDT (Ryan & Deci, 2000), these needs concern the experience of a sense of volition and psychological freedom (i.e., autonomy), a feeling of being connected with important others (i.e., relatedness satisfaction), and the experience of efficiency in daily tasks (i.e., competence satisfaction). Previous research has indicated that need satisfaction relates to multiple well-being outcomes, including vitality, life satisfaction, and positive affect (e.g., Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011). In contrast, need frustration has consistently been related to maladaptive outcomes, including emotional exhaustion (e.g., Van den Broeck, De Witte, Lens, & Vansteenkiste, 2008), depressive (Bartholomew et al., 2011), and physical symptoms (Unanue, Dittmar, Vignoles, & Vansteenkiste, 2014). Such findings have been obtained using both self-reports and ratings of adjustment (e.g., Ahmad, Vansteenkiste, & Soenens, 2013) and held in both correlational and experimental designs (e.g., Weinstein, Khabbaz, & Legate, 2016).

Nonetheless, studies examining whether the associations of need satisfaction and frustration with well-being and ill-being differ depending on individuals' need strength are relatively scarce (but see Schüler, Sheldon, Prentice, & Halusic, 2016). Herein, we operationalize need strength as people's interpersonal differences in the valuation of or desire to get a certain need met (Chen et al., 2015). The present contribution specifically focused on the need for autonomy, thereby examining whether individuals desiring to get their need for autonomy met or valuing the satisfaction of their autonomy would benefit more from its satisfaction, and, conversely, suffer more from its frustration. This issue was examined in a sample of students (Study 1) as well as prisoners (Study 2) who find themselves in a very restrictive and autonomy-thwarting environment.

The Need for Autonomy

Within SDT, autonomy is defined as the extent to which one fully accepts, endorses, and stands behind one's actions (Ryan & Deci, 2000). Individuals who have their autonomy satisfied experience their behavior as volitional, willingly enacted, and in line with their interests and values. In contrast, individuals who report autonomy frustration experience their behaving, thinking or feeling as controlled by external forces or internal compulsions. Note that within SDT, autonomy is not equated with independence (as is the case in some other theoretical notions; e.g., Iyengar & Lepper, 1999), but refers to a feeling of psychological freedom and volition. Indeed, from a SDT perspective, autonomy and independence are regarded to be quite separate as individuals can both willingly act independently or willingly rely on others for guidance and advise (Chen et al., 2015).

SDT further postulates that, because humans are active, growth-oriented organisms naturally pursuing higher levels of integration, the autonomy satisfaction is essential for their growth (Ryan & Deci, 2000; 2001). Conversely, autonomy frustration is associated with various forms of ill-being (e.g., Bartholomew et al., 2011; Unanue et al., 2014). Indeed, autonomy satisfaction and frustration represent relatively distinct constructs (Vansteenkiste & Ryan, 2013). This is because the absence of autonomy satisfaction does not necessarily imply autonomy frustration. Specifically, individuals' autonomy can be merely deprived, yet, for frustration to occur, their need has to be more actively thwarted. Consistent with this proposed distinction, an increasing number of studies have provided evidence for a dual pathway, indicating a valence congruency effect where autonomy satisfaction better predicts well-being outcomes, while autonomy frustration serves a better predictor of ill-being outcomes (e.g., Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015).

Importantly, autonomy satisfaction is presumed to be a universally critical nutrient, while its frustration is presumed to serve as universal poison. The universality claim of SDT has been examined in a variety of ways. First, autonomy seems to come with benefits, regardless of whether it is studied on the between-person or the within-person level (e.g., Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Van

der Kaap-Deeder, Vansteenkiste, Soenens, & Mabbe, 2016). That is, individuals thrive more if they experience greater autonomy when compared to others, but they also report greater well-being on specific days they experience more autonomy. Second, the benefits of autonomy were found to apply across life domains, including work, sports, education, health care, and psychotherapy (see Deci & Ryan, 2000 for a comprehensive overview). Yet, the role of autonomy has received less attention in life contexts where individuals' autonomy is typically not well supported, such as senior adults living in a home or prisoners in detention. Third, individuals of various ages, from new-born babies (e.g., Warneken & Tomasello, 2008) to late adults (Kasser & Ryan, 1999) were found to benefit from greater autonomy. Fourth, the cross-cultural role of autonomy has perhaps received the greatest attention, with both single-country (e.g., Yamauchi & Tanaka, 1998) and multi-country (e.g. Chen, Van Assche, Vansteenkiste, Soenens, & Beyers, 2014; Chen et al., 2015) studies indicating that need satisfaction yields positive outcomes for individuals in nations with very different cultural backgrounds. Finally, most recently, individuals' personality traits were considered as potential moderators (Mabbe, Soenens, Vansteenkiste, & Van Leeuwen, 2016). There was little evidence for moderation, with adolescents, regardless of their big five personality traits, benefitting from the experience of need satisfaction.

In short, many studies have, consistent with BPNT, documented the benefits associated with need satisfaction in general, and autonomy in particular. Most of these studies focused on the potential constraining role of sociodemographic characteristics (e.g., nation, age), methodological factors (e.g., within-person vs. between-person level) or the domain under investigation, while psychological characteristics (e.g., personality traits) received far less attention. Overall, most of these potentially moderating factors yield a rather distal relation to the concept of needs. Perhaps, the greatest potential for moderation and the chance to test the universality claims of SDT in the most conservative way involves the examination of more proximal psychological characteristics, that is, features that directly map onto one of the three needs, as exemplified by the work on need strength.

Individual Differences in Autonomy Strength

Need strength reflects interpersonal differences in the preference to get a particular need met and has been operationalized in two different ways. First, individuals can differ with regard to how important they regard the satisfaction of a certain need (i.e., need valuation; e.g., Heine, Lehman, Markus, & Kitayama, 1999). According to Motive Disposition Theory, such need valuation is shaped through previous social learning processes (McClelland, 1965). To illustrate, a child raised by parents focusing highly on the child's needs, interests and self-development is expected to have a strong need for autonomy in later life. Second, individuals can differ in how much they desire or want the satisfaction of a certain need (i.e., need desire). Such need desire is often rooted in the frustration or the lack of satisfaction concerning this need (Deci & Ryan, 2000; Sheldon & Gunz, 2009). That is, individuals feeling pressured in their daily activities (i.e., autonomy frustration) would experience a greater desire for autonomy satisfaction. Thus, whereas need valuation is expected to rise from previous encounters of need satisfaction, need desire has been found to stem from need-frustrating experiences (Sheldon & Gunz, 2009).

Based on Motive Disposition Theory, the argument could be forwarded that among individuals attaching greater importance to the fulfillment of the need for autonomy or expressing a stronger desire to get their autonomy met, autonomy satisfaction yields a stronger contribution to their well-being (Schultheiss, 2008). An even extremer interpretation would suggest that autonomy satisfaction *only* contributes to well-being among individuals high on need strength (e.g., Vallerand, 2000). In contrast, from a SDT-perspective, need strength is expected to have no or only a minimal moderating role in the relation between need satisfaction and well-being, as psychological needs are seen as universally essential nutriments for optimal psychological functioning (Deci & Ryan, 2000). Thus, everyone is expected to benefit and suffer from, respectively, need satisfaction and need frustration. It is important to note, however, that the needs addressed from Motive Disposition Theory (i.e., power, affiliation, and achievement; e.g., McClelland, 1965) do not match with the needs of autonomy, relatedness, and

competence within SDT, which makes a direct comparison between these two theoretical notions difficult. Still, the more general reasoning within Motive Disposition Theory can be applied to the SDT-needs.

Previous studies concerning the moderating role of need strength are relatively scarce and have thus far provided mixed results (e.g., Chen et al., 2015; Schüler & Brandstätter, 2013; Schüler, Brandstätter, & Sheldon, 2013). Additionally, most of these studies focused on t relatedness or competence and less on autonomy (e.g., Schüler & Kuster, 2011) and assessed need valuation rather than need desire (but see Chen et al., 2015 for an exception). For instance, Schüler, Sheldon, and Fröhlich (2010) showed across three studies among undergraduate students that competence satisfaction (during sports activities) had especially beneficial effects on a range of domain-specific positive outcomes (e.g., flow) for those individuals scoring high on implicit need for achievement (i.e., an acquired preference for competence-satisfying experiences). In contrast, the explicit measure of need for achievement did not serve as a significant moderator. Further, Sheldon and Schüler (2011) found that both implicit and explicit need strength with respect to the needs for achievement and affiliation failed to moderate the positive relation between, respectively, competence and relatedness satisfaction and global well-being.

With respect to autonomy, only two studies are available. First, Chen et al. (2015) found in a broad university sample involving four culturally diverse nations (i.e., Belgium, China, USA, and Peru) that neither autonomy valuation nor autonomy desire, both assessed explicitly, moderated the positive relation between autonomy satisfaction and well-being and between autonomy frustration and ill-being. Second, Schüler and colleagues (2016) showed in a first study among undergraduate students that autonomy satisfaction related more strongly to flow during learning among individuals with a strong implicit need for autonomy. Additionally, in a second study among physically inactive individuals, autonomy satisfaction only contributed to sports-related well-being among individuals with a strong or

average (but not weak) implicit need for autonomy (Schüler et al., 2016). In line with the study of Schüler and colleagues (2010), they found no evidence for a moderating role of explicit need strength.

We would like to note that the size of the obtained moderation effect in previous studies, even if an interaction occurred, was rather modest, with the main effect of need satisfaction on well-being often standing, that is, applying across different levels of the moderator. For example, Schüler and colleagues (2010) reported that even among those low in implicit competence satisfaction came with benefits. This suggests that it is critical to investigate the need satisfaction – outcome slopes among those high and low in need strength.

Considerations when Investigating the Role of Need Strength

As previous studies on need strength have employed different methods and were rooted in theoretically diverse traditions, it is difficult to directly compare their results. Overall, apart from the scarcity of work that focuses on autonomy strength, we additionally identify a number of caveats that deserve greater attention.

First, in previous studies, need strength has been assessed by either an explicit measure, by an implicit measure, or by both. As alluded upon before, a moderating effect of need strength has only been found when employing an implicit measure (Schüler et al., 2016). However, for both the implicit and explicit measurement of need strength, a diversity of instruments has been employed which often do not directly or exclusively capture the valuation of or desire for a certain need, instead representing a variety of different issues. For instance, Schüler and colleagues (2016) assessed explicit autonomy strength by measures of autonomy orientation (i.e., the general orientation towards autonomous functioning), which does not directly refer to the valuation of or the desire for autonomy.

Second, previous studies on need strength have examined well-being at three distinct levels, that is, in relation to a specific activity at a specific moment (i.e., situational level), in relation to a life domain (e.g., school; contextual level), or towards life in general (i.e., global level; see Vallerand, 2000). Although need strength has been found to moderate the relation between need satisfaction and

situational and contextual well-being (e.g., Schüler et al., 2010, 2016), such effects have not been observed at the global level (Chen et al., 2015; Schüler et al., 2013; Sheldon & Schüler, 2011). At the same time, the work including measures of global well-being is rather scarce, suggesting a need for more research.

Third, previous studies on the moderating role of need strength almost exclusively focused on need satisfaction rather than frustration (for the only exception, see Chen et al., 2015). This is unfortunate, as the results obtained previously with regards to need satisfaction cannot be assumed to be also applicable to need frustration (Vansteenkiste & Ryan, 2013). Thus, it remains to be seen whether individuals high on need strength would not only benefit more from need-satisfying experiences, but would also suffer more from need-frustrating events.

The Present Research

Given the paucity of previous work on the potential moderating role of autonomy strength and the theoretical importance of this issue, we sought to further investigate this topic in two samples, one compromising South-African students (Study 1) and one compromising Belgian prisoners (Study 2). In both studies, the role of both autonomy satisfaction and frustration in the prediction of both well-being and ill-being was explored. While the role of both autonomy valuation and autonomy desire was examined in Study 1, Study 2 focused on the role of need desire. Yet, different from Study 1, which made use of explicit need strength measures only, both implicit and explicit need desire as well as implicit and explicit autonomy satisfaction was assessed in Study 2.

The inclusion of multiple outcomes (i.e., well-being and ill-being), multiple predictors (i.e., autonomy satisfaction and frustration) as well as different operationalizations (i.e., both implicit and explicit), and the study of these dynamics among individuals heavily threatened (i.e., prisoners) and more protected (i.e., students) in their autonomy, allowed us to examine how systematic any documented main and interactions effects would be. The following two hypotheses were proposed.

First, in both studies, we expected that autonomy satisfaction would relate to higher levels of well-being and lower levels of ill-being, whereas an opposite relation was expected for autonomy frustration (Hypothesis 1). Second, based on SDT, we hypothesized that autonomy need strength would only play a minimal moderating role, such that the hypothesized main effect of autonomy satisfaction and frustration would apply for individuals both high and low in autonomy strength. If some variation would exist in the strength of this association, it would be a matter of gradation and, based on previous research (Schüler et al., 2010, 2016), such moderation should occur primarily for implicit instead of explicit measures of need strength.

Study 1

Method

Participants and Procedure

A total of 224 South African young adults (54.0% males; M_{age} = 24.13, SD_{age} = 4.25) participated in this study. We sampled students from different institutions: two universities (74.1%) and one college (25.8%). The ethnic distribution was as follows: 57.6% African, 28.6% Caucasian, 8.9% Colored (i.e., people of mixed race) and 4.9% Asian. This distribution deviates somewhat from the total population of South Africa (CIA World Factbook, 2016). Specifically, Caucasians were overrepresented while Africans were underrepresented, which is likely due to the sampling of university and college students. As for living area, 47.8% of participants came from urban areas in the Gauteng Province, 24.1% from rural areas and 28.1% from township areas around Pretoria, the executive capital city. Relative family income was assessed with a five-point scale asking participants to compare their family income with the average income level of the country. Participants also had the option to keep this information private. The scores for income largely followed a normal distribution. Thirteen percent of the participants reported their monthly family income to be much below the

average country level, 26.8% below the average, 23.2% around the average, 17.8% above average, 3.1% much above the country average, and 16.1% chose not to divulge this information. Students filled out the questionnaires in the classroom. Prior to completing the questionnaires, an investigator explained the purpose of the study and guaranteed anonymity .

Measures

All questionnaires were administered in English, the working language in the participating universities and college.

Autonomy Satisfaction and Frustration. To assess autonomy satisfaction and frustration, we used the eight autonomy items of the Basic Psychological Need Satisfaction and Need Frustration scale (BPNSNF). This scale was recently validated across four countries (Chen et al., 2015) and the autonomy subscale is assessed with eight items, consisting of a balanced combination tapping into both satisfaction (e.g., ‘‘I feel my decisions reflect who I really am’’) and frustration (e.g., ‘‘I feel forced to do many things I wouldn’t choose to do’’). Items were rated on a 5-point Likert scale, ranging from 1 (‘‘Completely Untrue’’) to 5 (‘‘Completely True’’). Both dimensions yielded reliable scales ($\alpha = .79$ for satisfaction, and $\alpha = .66$ for frustration).

Autonomy Desire. Desire for autonomy satisfaction was assessed with three items from the Needs as Motives scale (Sheldon & Gunz, 2009). An example item reads “If you would have the chance to make a change in your life, how much would you like to have the following change? [stem] You manage to create a life style where others no longer pressure you, and you feel free to do what you really want to do.”. Items were rated on a 5-point Likert scale, ranging from 1 (‘‘No desire for this change”) to 5 (‘‘Much desire for this change’’). This scale had a good reliability ($\alpha = .71$).

Autonomy Valuation. Valuation of autonomy satisfaction was measured by adapting the four items of the autonomy satisfaction subscale. Each item was preceded by the stem “Please indicate how much you value the following experiences. How important is it for you personally to have each of the following experiences?”. An example item is: “How important is it for you to feel that your decisions

reflect who you really are?". Items were rated on a 5-point Likert scale, ranging from 1 (''Not important at all") to 5 (''Very important to me''), yielding a reliable scale (α = .77).

Well-being. Well-being was measured by three indexes, namely life satisfaction, vitality and self-acceptance, which have been widely used in previous cross-cultural studies (e.g., Oishi, Diener, Lucas, & Suh, 1999). Life satisfaction was measured with the 5-item Satisfaction with Life scale (Diener, Emmons, Larsen, & Griffin, 1985). An example item is: "In most of ways, my life is close to my ideal". Vitality, i.e., feelings of energy and vigor experienced over the past few months, was assessed with the 7-item Subjective Vitality scale (Ryan & Frederick, 1997). An example item is: "I feel alive and vital". Self-acceptance, involving a positive attitude towards oneself and the past, was measured with nine items from the Psychological Well-being scale (Ryff, 1989). An example item reads "In general, I feel confident and positive about myself". All items were rated on a 5-point Likert scale, ranging from 1 (''Completely Untrue'') to 5 (''Completely True''). The subscales were all positively and significantly interrelated (*r*s > .42, *p* < .001) and were collapsed to form a composite score of well-being (α = .88).

Ill-being. Ill-being was measured by tapping into depressive symptoms, using the Centre for Epidemiological Studies-Depression (CES-D) scale (Radloff, 1977). The CES-D consists of ten items referring to how the participant has felt and behaved during the last week. Participants chose the appropriate number between 1 ("Less than one day") to 4 ("More than 5 days") to indicate how often they had a particular feeling (e.g., "I had trouble keeping my mind on what I was doing"). This scale was reliable (α = .82).

Results

Descriptive Statistics and Preliminary Analyses

Descriptive statistics and bivariate correlations between the study variables can be found in Table 1. Autonomy satisfaction and frustration were negatively interrelated, autonomy desire and

valuation were unrelated. Further, autonomy satisfaction and valuation were positively related, and autonomy frustration was positively related to autonomy desire and negatively to autonomy valuation. Finally, well-being was positively associated with both autonomy satisfaction and valuation and negatively associated with both autonomy frustration and desire. Ill-being showed the opposite pattern of results.

With regard to the background variables, results of bivariate correlations showed that age (r = -.15, p < .05) and education (r = -.16, p < .05) were negatively related to well-being, whereas they were positively related to ill-being (r = .20, p < .01; and r = .18, p < .05). Additionally, education was positively related to autonomy desire (r = .17, p < .05) and negatively to autonomy valuation (r = -.17, p < .05). An independent samples t-test indicated that there were no gender differences in all variables of interest. Likewise, a one-way ANOVA showed no differences between areas of living. Interestingly, there were differences between the four ethnic groups in terms of ill-being (F(3, 208) = 3.35, p < .05, η^2 = .05) and autonomy valuation (F(3, 202) = 3.35, p < .05, η^2 = .04). Specifically, Asian respondents (M = 2.34; SD = 1.07) reported significantly more ill-being compared to Caucasian (M = 1.73; SD = 0.56), African (M = 1.76; SD = 0.58), and Colored (M = 1.69; SD = 0.62) respondents. Also, Asian respondents (M = 4.86; SD = 0.23) were significantly higher in autonomy valuation compared to Caucasian (M = 4.44; SD = 0.54), and African (M = 4.39; SD = 0.66) respondents.

Table 1

Descriptives of and Correlations between the Variables (Study 1)

	1	2	3	4	5	6
Autonomy-related measures						
1. Autonomy satisfaction	-					
2. Autonomy frustration	-.37***	-				
3. Autonomy desire	-.10	.14*	-			
4. Autonomy valuation	.28***	-.17*	.04	-		
Outcomes						
5. Well-being	.64***	-.31***	-.14*	.32***	-	
6. Ill-being	-.48***	.46***	.22***	-.27***	-.57***	-
M	4.12	2.18	3.24	4.45	3.85	1.78
SD	0.74	0.84	1.10	0.60	0.32	0.62

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

Primary Analyses

To investigate whether autonomy desire and valuation moderated the relation between autonomy satisfaction or frustration and well-being or ill-being, we performed eight separate hierarchical regression analyses (four for well-being; four for ill-being, while controlling for all background variables). In a first step, we simultaneously entered the centered score of either autonomy satisfaction or frustration in combination with either autonomy desire or valuation as predictors, while in a second step, their respective interaction term was added. These results are displayed in Table 2 (with the left panel presenting results for autonomy desire and the right panel for autonomy valuation).

First, across all analyses, autonomy satisfaction related positively to well-being and negatively to ill-being, whereas autonomy frustration showed an opposite pattern of results. Furthermore, autonomy desire related positively to ill-being, and autonomy valuation related positively to well-being and negatively to ill-being. Further, of the eight investigated interaction-terms, four were significant, with three of them concerning autonomy desire and one concerning autonomy valuation.[2] Specifically, autonomy desire moderated the relation between autonomy satisfaction and well-being, between autonomy satisfaction and ill-being, and between autonomy frustration and ill-being. Autonomy valuation only moderated the relation between autonomy frustration and ill-being.

[2] Additional hierarchical regression analyses with the separate indicators of well-being (i.e., life satisfaction, vitality and self-acceptance) as outcomes showed that only two of the 12 investigated interactions were significant. That is, autonomy desire moderated the relation between autonomy satisfaction and self-acceptance, and autonomy valuation moderated the relation between autonomy satisfaction and vitality. Both interactions were consistent with Figure 1a.

Table 2

Hierarchical Regression Analyses with Autonomy Satisfaction or Autonomy Frustration, Autonomy Desire (Left Panel) or Autonomy Valuation (Right Panel), and their Interaction Predicting Well-being or Ill-being (Study 1)

	Desire				Valuation			
	Well-being		Ill-being		Well-being		Ill-being	
	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2	Step 1	Step 2
	β	β	β	β	β	β	β	β
Autonomy satisfaction	.64***	.60***	-.46**	-.41**	.60***	.58***	-.43***	-.42***
Autonomy strength	-.07	-.11*	.17**	.22***	.16**	.17**	-.15*	.17**
Interaction		.15**		-.19**		.10		-.11
ΔR^2	.42	.02	.26	.03	.44	.00	.25	.01
F for R^2 change	75.53***	7.91**	35.86***	9.19**	78.20***	3.22	33.12***	2.95
Autonomy frustration	-.30***	-.27***	.43***	.38***	-.27**	-.26**	.42***	.40***
Autonomy strength	-.10	-.12	.16**	.20**	.28***	.31***	-.20***	-.24***
Interaction		-.10		.18**		-.09		.13*
ΔR^2	.11	.01	.23	.03	.17	.01	..25	.01
F for R^2 change	12.70***	1.97	31.50***	8.03**	21.33***	1.73	32.92***	4.32*

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

These four significant interactions were further examined by means of simple slope analyses, in which the significance of the slopes of the regressions at two levels of the moderator are calculated, that is, at low (i.e., < 1 *SD* below the mean) and high (i.e., > 1 *SD* above the mean) levels of autonomy desire or valuation (Hayes & Matthes, 2009). As displayed in Figure 1a, both individuals high (β = .74; $t = 11.60$; $p < .001$) and low in autonomy desire (β = .46; $t = 5.52$; $p < .001$) strongly benefited from autonomy satisfaction in terms of higher well-being. As displayed in Figure 1b, both individuals high (β = -.57; $t = -7.77$; $p < .001$) and low in autonomy desire (β = -.20; $t = -2.15$; $p < .05$) strongly benefited from autonomy satisfaction in terms of lower ill-being. As displayed in Figure 1c, both individuals high (β = .56; $t = 7.54$; $p < .001$) and low in autonomy desire (β = .22; $t = 2.23$; $p < .05$) suffered from autonomy frustration in terms of higher ill-being. Finally, as displayed in Figure 1d, both individuals high (β = .53; $t = 6.38$; $p < .001$) and low in autonomy valuation (β = .26; $t = 2.76$; $p < .01$) strongly suffered from autonomy frustration in terms of higher ill-being. In sum, the slopes for the effects of autonomy satisfaction and frustration on well- and ill-being were always significant, though the associations tended to be more pronounced among those high in autonomy desire or valuation.

Supplementary Analyses

To examine the unique effects of need satisfaction and need frustration in the prediction of either well- or ill-being, we ran four additional regression analyses examining autonomy satisfaction and frustration simultaneously, focusing on either autonomy desire or valuation as a moderator, and well-being or ill-being as an outcome. The results revealed two interesting patterns. First, while only autonomy satisfaction significantly predicted well-being, both autonomy satisfaction and frustration predicted ill-being. Second, none of the interactions reached significance when examining autonomy satisfaction and frustration simultaneously.

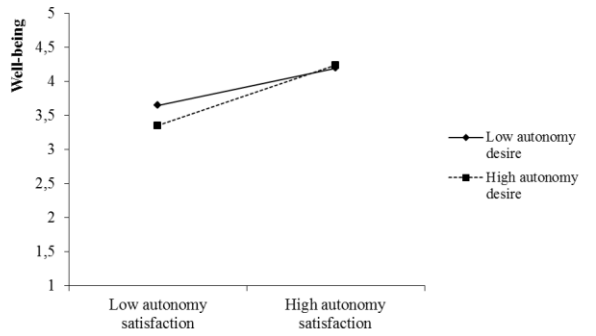

Figure 1a.

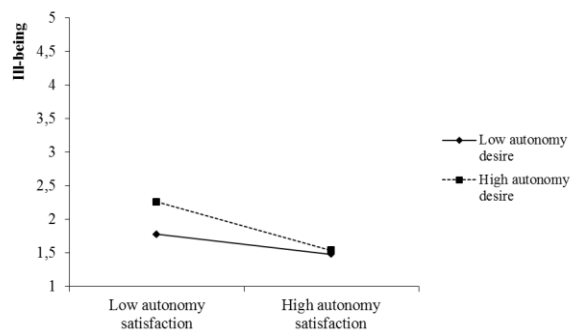

Figure 1b.

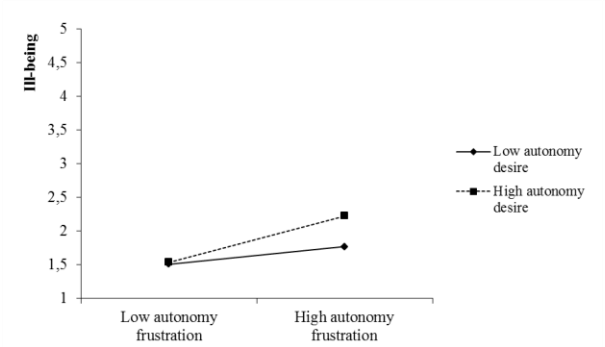

Figure 1c.

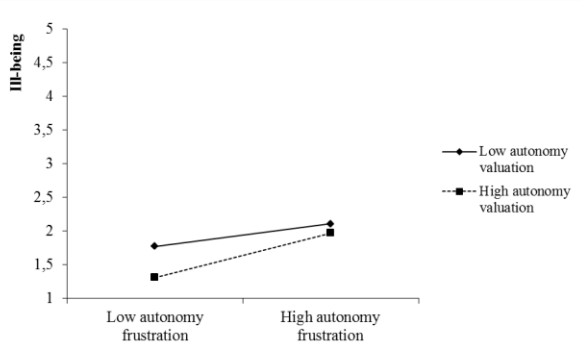

Figure 1d.

Figure 1. Two-way Interactions of Autonomy Satisfaction or Frustration x Autonomy Strength predicting Well- or Ill-being (Study 1).

a. Autonomy Satisfaction x Autonomy Desire predicting Well-being (Upper Left Panel).

b. Autonomy Satisfaction x Autonomy Desire predicting Ill-being (Upper Right Panel).

c. Autonomy Frustration x Autonomy Desire predicting Ill-being (Lower Left Panel).

d. Autonomy Frustration x Autonomy Valuation predicting Ill-being (Lower Right Panel).

Brief Discussion

Confirming our first hypothesis, we found that autonomy satisfaction was consistently positively related to well-being and negatively to ill-being, while autonomy frustration showed an opposite pattern. Regarding our second hypothesis, results showed that half of the tested interaction effects were significant. More importantly, simple slope analyses indicated that the effects of autonomy satisfaction and frustration on well- and ill-being were always significant, though the association tended to be more pronounced among those high in autonomy strength, especially those desiring to get their autonomy more met.

Study 2

Study 2 differed from Study 1 in two significant ways. First, in Study 2, we focused only on autonomy desire (and not autonomy valuation) as an indicator of autonomy strength. This was done for two reasons. First, based on the results of Study 1, autonomy desire seemed to have the most potential to moderate the relation between autonomy satisfaction or frustration and psychological functioning. Second, as Study 2 focused on a sample of prisoners, autonomy desire was assumed to be more prominent than autonomy valuation. Indeed, prison is a context where individuals' autonomy is heavily thwarted (e.g., Bukstel & Kilmann, 1980) and, as a result, prisoners may strongly long for or even crave for autonomy.

Second, in accordance with the majority of studies on the moderating role of need strength (e.g., Schüler et al., 2010), autonomy desire was assessed both with an explicit measure and an implicit measure. From a dispositional motivational approach (McClelland, 1965), implicit measures of need strength are of more value than their explicit counterparts. Specifically, implicit measures are assumed to measure need preference as developed from early affective experiences (rather than from more

cognitive processes that occur later in life), to be more responsive to task-inherent incentives (rather than social-extrinsic incentives; e.g., McClelland, Koestner, & Weinberger, 1989), and to be more predictive of spontaneous behavior (Gawronski, 2009). Therefore, to more fully capture the possible moderating role of autonomy desire, we assessed this construct explicitly as well as implicitly.

Method

Participants

Participants were 156 Belgian, mostly male (88.5%), prisoners and were on average 38.60 years old (*SD* = 11.68).Compared to the general population of Belgian prisoners, this sample consisted of slightly less males (95.6%; Justice Federal Public Services, 2015) and relatively old prisoners (in 2010, 52% of Belgian prisoners were between 21 and 35 years old; Van Malderen, Pauwels, Walthoff-Borm, Glibert, & Todts, 2011). Most participants were Belgian nationals (86.0%) and were currently single (38.9%) or had been living with a partner before their detention (26.8%). Additionally, most participants (59.9%) had at least one child. Education levels ranged from no education (1.3%) to primary school (10.2%), high school (72.0%), and higher education (15.9%). Nationality, marital status, parental status, and education level were all in line with the general population of Belgian prisoners (Vanhaegendoren, Lenaers, & Valgaeren, 2001).

With regard to participants' prison status, 65.0% was convicted of a crime, 26.1% was accused (but not yet convicted), and 8.3% was interned[3] (vs. 58.5%, 31.7%, and 8.2%, respectively, in the general prison population; Justice Federal Public Services, 2015). We also inquired prisoners about the reason for their imprisonment. The following crimes were reported: 32.1% crimes of violence; 18.6%

[3] Under Belgian Law, mentally ill offenders, who are considered not to be accountable for their crime due to their psychiatric disorder, can be interned. Rather than being a punishment, internment is a safety measure which excludes mentally ill offenders from society (to prevent further harm) while also providing treatment (see also Vandevelde et al., 2011 for an overview of internment in Belgium).

drug-related crimes, 9.6% crimes of property, 15.4% other type of crimes (e.g., distribution of child pornography) and 22.4% of the prisoners were detained because of multiple crimes (this information was missing for 3 participants). On average, participants had spent 25.46 months (*SD* = 34.77) in prison. Of the convicted participants, the average received sentence was about 7 years (*M* = 82.76 months; *SD* = 76.20). The relatively long average sentence length and high frequency of serious crimes in the current sample likely reflects the tendency in Belgian sentencing policy to assign individuals sentenced to three years or less to electronic monitoring instead of detention in prison ("Elektronisch toezicht als alternatief", 2016). Finally, with regard previous incarceration, 42.0% had been in prison before (2 missing; vs. 55.4% in the general population; Vanhaegendoren et al., 2001)..

Procedure

Data were collected between December 2014 and March 2016 in seven prisons within Flanders (i.e., the Dutch-speaking part of Belgium). Once approval was obtained from the Justice Federal Public Services and the university's ethical committee, we contacted and informed each prison's directorial board via e-mail and phone concerning the study objectives and methodology. Subsequent practical arrangements were discussed with each internal contact person. More specifically, all prisoners were informed through a flyer describing the procedure and main goal of the study (gaining insight in prisoners' well-being). On this flyer, prisoners could indicate whether and when they wanted to participate. Flyers were distributed and collected via the prison's internal mailing system. Based on this information, a schedule was made for the individual testing of each prisoner who wanted to participate. Prisoners who were deemed to be too dangerous by the directorial board, had a sanction (e.g., solitary confinement) at the time of assessment, or had insufficient knowledge/reading skills of Dutch, were excluded from participation.

The questionnaires were first pilot-tested among two prisoners to ensure that all items were clear and understandable. Based on this pilot test, we made a few minor changes to some of the items

(e.g., prisoners preferred a Likert scale instead of a Visual Analogue scale). The Implicit Association Tests (IATs) and questionnaires were completed individually in a separate room within the prison, under supervision of one of the authors. Participants first received an information letter concerning the study aims and procedure, which were, subsequently, also explained orally. Additionally, before filling out the informed consent, participants were informed that participation was fully voluntary, anonymous, without any financial reward, and that they could stop their participation at any moment. This was followed by the completion of the autonomy satisfaction and desire IAT, of which the order was counterbalanced between individuals. Due to time restraints and difficulties in understanding the IATs, 4 participants did not complete the satisfaction IAT and 9 did not complete the desire IAT. Additionally, due to technical problems, we were unable to let 18 participants take part in the autonomy desire IAT. In sum, 96.8% and 78.8% participants completed the autonomy satisfaction and desire IAT, respectively. Subsequently, there was a paper-and-pencil administration of the questionnaires and the participant was allowed to ask questions at any moment. As 7 participants experienced difficulties in reading the questionnaires, these were read to them. Finally, participants received an oral and written debriefing in which the study aims were explained more elaborately.

Measures

All items were answered on a Likert scale ranging from 1 (*not at all true*) to 5 (c*ompletely true*), unless indicated otherwise.

Background Variables. We assessed age, gender, nationality, education, marital status, parental status (i.e., having at least one child), prison (one of the seven prisons), prison status (i.e., accused, convicted, or interned), prison regime (i.e., open, half open or closed), months spent in prison, received sentence time (in months; for those who were convicted), previous imprisonment, and reason for imprisonment. Reason for imprisonment was reported by the prisoners and was later coded based on a subscale of the European Addiction Severity Index- Treatment Demand Indicator (EuropASI-TDI;

Kokkevi et al., 1993), a standardized screening measurement mainly used in individuals with substance-use related problems. The following categories were obtained: 1 = possession or trafficking of illegal drugs; 2 = crimes of property (e.g., burglary, theft/shoplifting, fraud, forgery, extortion, and trading in or distributing stolen goods); 3 = crimes of violence (e.g., battery, robbery, arson, sexual assault, rape, manslaughter, and murder); 4 = other crimes (e.g., distribution of child pornography, prostitution, stalking); 5 = multiple crimes.

Autonomy-related Measures

Autonomy Satisfaction and Frustration – Explicit. as in Study 1, we employed the Autonomy subscale of the BPNSNF scale (Chen et al., 2015). To ensure that the items would be understandable, we used a simplified version (Van der Kaap-Deeder et al., 2015). For example, "I feel I have been doing what really interests me" was changed into "What I do, really interests me". Both the autonomy satisfaction (α = .84) and frustration (α = .79) subscales were reliable.

Autonomy Satisfaction – Implicit. Previous implicit measures of need strength mostly consisted of tasks wherein individuals' need strength was extracted from stories written in response to pictures (McClelland et al., 1989). As such story-tasks have often been criticized for their poor psychometric properties (e.g., low internal consistency; Lilienfeld, Wood, & Garb, 2000), we employed an Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) to implicitly assess both individuals' autonomy satisfaction and desire,.

Participants were first informed via written instructions on the computer screen that they needed to categorize each depicted sentence into one of four possible categories, namely *I feel free*, *I feel forced*, *true*, and *not true*. On an AZERTY key board, they could indicate their answer by pressing either the left yellow response key (Q; yellow sticker) or the right blue response key (M; blue sticker), meaning that the sentence belongs to the category portrayed, respectively, in the left upper corner

highlighted in yellow or the right upper corner highlighted in blue. Furthermore, participants were told to respond as quickly as possible without making too many mistakes.

We developed stimuli related to autonomy satisfaction and frustration on the basis of the BPNSF (Chen et al., 2015). Stimuli for *I feel free* were: 'I am myself', 'I make decisions that fit with who I am', 'I experience choice', and 'I experience a sense of freedom'. Stimuli for *I feel forced* were: 'I experience pressure', 'I am restricted in what I do', 'I feel obligated', and 'I feel that I am put under pressure'. The stimuli belonging to the categories *true* and *not true* were based on previous research employing the autobiographical IAT (e.g., Sartori, Agosta, Zogmaister, Ferrara, & Castiello, 2008). For the *true* category these were: 'I am sitting in front of the computer', 'I am in a room', 'I am participating in a study', and 'I am sitting on a chair'. For the *not true* category these were: 'I am climbing a mountain', 'I am in the bathroom', 'I am exercising', and 'I am eating'.

As recommended by Greenwald and colleagues (1998), the IAT consisted of seven blocks. In the first block (24 trials), participants were required to discern between *I feel forced*- and *I feel free*-related sentences by pressing the left yellow key or the right blue key, respectively. Then, in Block 2 (24 trials), participants categorized sentences either in the *true* category (left yellow key) or in the *not true* category (right blue key). In the first two combined blocks (Block 3 and 4; 96 trials) the categories *I feel forced* and *true* were displayed below each other in the left upper corner of the screen, whereas in the right upper corner the categories *I feel free* and *not true* were put together. Participants had to categorize sentences belonging to the *I feel forced* (e.g., 'I experience pressure') or *true* (e.g., 'I am in a room') categories by pressing the left yellow button and to categorize sentences belonging to the *I feel free* (e.g., I am myself') or *not true* (e.g., 'I am in the bathroom') categories by pressing the right blue button. These were the incongruent blocks assessing the association between the self and autonomy frustration. Subsequently, in Block 5 (24 trials) only the autonomy-related categories were displayed, but their position was switched so that participants were required to press the left yellow button when

encountering an *I feel free*-related sentence and the right blue button when seeing an *I feel forced*-related sentence. The last blocks (Block 6 and 7; 96 trials) were again combined blocks, but now with *I feel free* and *true* portrayed in the left corner and *I feel forced* and *not true* in the right corner. Participants had to categorize sentences belonging to the *I feel free* or *true* categories by pressing the left yellow button and to categorize sentences belonging to the *I feel forced* or *not true* categories by pressing the right blue button. These were the congruent blocks assessing the association between the self and autonomy satisfaction.

The stimuli that needed to be categorized were displayed in the center of a black computer screen in white uppercase letters (Arial font). The categories were presented in the upper corners of the screen using black bold uppercase letters (Courier font) in two filled (left: yellow; right: blue) squares. The interstimulus interval was 400 ms and within each block, stimuli were shown randomly. When a participant made an error, a red 'X' appeared and participants needed to press the correct key to continue with the task. The IAT was programmed using the INQUISIT Milliseconds software package (INQUISIT 3.0.6.0, 2011 and 4.0.7.0, 2014).

Autonomy Desire – Explicit. In this study, autonomy strength was operationalized as desire for autonomy, using 4 items based on the Autonomy Satisfaction subscale of the BPNSNF scale (Chen et al., 2015) and preceded by the stem 'At this moment I desire…'. An example item is "…to do what I think is really interesting". This scale had a good reliability ($\alpha = .87$).

Autonomy Desire – Implicit. The IAT for the assessment of autonomy desire was similar to the satisfaction IAT as discussed above, with the exception that the category *I feel free* was replaced with *I desire freedom,* and the category *I feel forced* replaced with *I desire coercion.* Stimuli for the category *I desire freedom* were 'I yearn to be myself', 'I want to make decisions that fit with who I am', 'I long for choice', and 'I desire to experience a sense of freedom' and for the category *I desire*

coercion these were ‘I yearn for pressure’, ‘I want to be restricted in what I do’, ‘I long for obligations’, and ‘I desire pressure’.

Well-being. We assessed vitality and quality of life as indicators of well-being. Vitality as experienced within prison was assessed with 3 adapted items (e.g., ‘‘Within prison, I feel alive’’) of the Subjective Vitality Scale (Ryan & Frederick, 1997). Quality of life was assessed by the EUROHIS-QOL 8-item index (European Health Interview Survey - Quality of Life; Schmidt, Mühlan, & Power, 2006), a short measure derived from the World Health Organization - Quality of Life measures (i.e., WHOQOL-100 and the WHOQOL-BREF), which has been also been used in previous studies among prisoners (e.g., Zwemstra, Masthoff, Trompenaars, & De Vries, 2009). This scale represents quality of life in the psychological, physical, social and environmental domain. An example item is: “How would you rate your quality of life?”. Items were rated on a 5-point Likert scale ranging from 1 (“V*ery Bad/Very Unsatisfied/Not At All”*) to 5 (“*Very Good/Very Satisfied/Completely”*). Scores across both scales (r = .61, p < .001) were standardized and summed to create a general index of well-being. This scale showed an excellent reliability (α = .85).

Ill-being. State anxiety and aggression, as experienced within prison, were measured as indicators of ill-being. State anxiety was assessed with six items from the State-subscale of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). An example item is: “Within prison, I feel tense”. Aggression was measured with an abbreviated 13-item version of the Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992). The BPAQ measures four types of aggressive traits: physical aggression (e.g., "If somebody hits me, I hit back"), verbal aggression (e.g., “I can't help getting into arguments when people disagree with me”), anger (e.g., “When frustrated, I let my irritation show”) and hostility (e.g., “When people are especially nice, I wonder what they want”). Scores across both scales (r = .29, p < .001) were standardized and summed to create a general index of ill-being yielding a reliable scale (α = .84).

Results

Descriptive Statistics and Preliminary Analyses

First, as for the responses on the IATs, we found that thirteen (autonomy satisfaction IAT: 3; autonomy desire IAT: 10) participants had a reaction time of 300 ms or less on at least 10% of the trials or had an error rate of at least 40% on either the practice trials (Block 3 and Block 6) or test trials (Block 4 and Block 7) on which the final score is calculated. IAT data of these participants were, therefore, excluded. Next, IAT-scores were calculated using the (improved) D4-scoring algorithm (Greenwald, Banaji, & Nosek, 2003). Latencies on error trials were replaced by the mean of the correct responses plus a penalty of 600 ms and the IAT effect was determined by subtracting the latencies of Block 3 and 4 (self + autonomy frustration/no autonomy desire) from the latencies of Block 6 and 7 (self + autonomy satisfaction/autonomy desire). To obtain IAT scores reflecting the strength of the association between 'I feel free ' and 'true' (autonomy satisfaction IAT) or between 'I desire freedom' and 'true' (autonomy desire IAT), scores were multiplied by -1. To estimate the reliability, we randomly split our data in two equal halves. We then calculated for each subset the D-scores. Next, we correlated the obtained D-scores. This procedure was repeated 1000 times. The mean correlation of the obtained correlation coefficients was calculated and corrected using the Spearman-Brown formula. As such, reliability estimates of .80 for the autonomy satisfaction IAT and .83 for the autonomy desire IAT were obtained. Independent samples *t*-tests indicated that there were no mean-level differences in the autonomy satisfaction ($t(115) = 0.27$, $p > .05$) or the autonomy desire ($t(110) = 0.09$, $p > .05$) score depending on the order in which these were completed.

Descriptive statistics and bivariate correlations between the study variables can be found in Table 3.

Table 3

Descriptives of and Correlations between the Variables (Study 2)

	1	2	3	4	5	6	7
Autonomy-related measures							
1. Autonomy satisfaction (E)	-						
2. Autonomy frustration (E)	-.55***	-					
3. Autonomy satisfaction (I)	.23**	-.26**	-				
4. Autonomy desire (E)	.04	.20*	.09	-			
5. Autonomy desire (I)	.05	-.01	-.07	-.06	-		
Outcomes							
6. Well-being	.32***	-.33***	.02	-.10	.13	-	
7. Ill-being	-.24**	.46***	-.06	.14	-.11	-.51***	-
M	3.21	3.01	0.43	4.56	0.39	0.00	0.00
SD	0.99	0.99	.28	0.64	0.33	0.90	0.80

Note. E = Explicit measure; I = Implicit measure. *$p < .05$. **$p < .01$. ***$p < .001$.

Explicit autonomy satisfaction related positively to well-being and negatively to ill-being, while autonomy frustration showed an opposite pattern of results. Implicit autonomy satisfaction and autonomy desire (both explicit and implicit) were unrelated to well-being and ill-being. Additionally, autonomy frustration was negatively associated with explicit and implicit autonomy satisfaction and positively with explicit autonomy desire. Finally, explicit and implicit autonomy satisfaction were positively interrelated.

With respect to the background variables, results of bivariate correlations showed that whereas age (r = -.19, p < .05) and education (r = -.21, p < .01) were negatively related to ill-being, time spent in prison showed a positive relation (r = .34, p < .001). Additionally, older participants had lower scores on the autonomy satisfaction IAT (r = -.23, p < .01). Independent samples t-tests further indicated that female prisoners (M = 0.58; SD = 0.30) experienced more implicit autonomy desire than male prisoners (M = 0.36; SD = 0.33); t(111) = 2.43, p < .05, prisoners with children (M = 0.39; SD = 0.28) experienced less implicit autonomy satisfaction than prisoners without children (M = 0.50; SD = 0.29); t(146) = -2.29, p < .05, and participants who had been previously imprisoned (M = 0.18; SD = 0.79) reported higher levels of ill-being compared to those who had not been previously imprisoned (M = -0.12; SD = 0.79); t(151) = 2.27, p < .05. Finally, results of a MANOVA indicated significant differences in implicit autonomy desire (F(6,102) = 3.36, p < .01, η^2 = .17) between the prisons.

Primary Analyses

To investigate whether autonomy desire (explicit and implicit) moderated the relation between autonomy satisfaction (explicit or implicit) or autonomy frustration and well- or ill- being, we performed 12 separate hierarchical regression analyses (six for well-being; six for ill-being, while controlling for all background variables). In a first step, we entered simultaneously the standardized score of autonomy satisfaction (explicit or implicit) or autonomy frustration and autonomy desire (explicit or implicit) as predictors, while in a second step, their respective interaction term was added.

These results are displayed in Table 4, with explicit autonomy desire (left panel) and implicit autonomy desire as a moderator (right panel).

With regard to Step 1, similar to Study 1, explicit autonomy satisfaction related positively to well-being and negatively to ill-being, whereas autonomy frustration showed an opposite pattern of results. Different from the measures of explicit autonomy satisfaction, its implicit counterpart was unrelated to well- and ill-being. Further, neither implicit nor explicit autonomy desire yielded any systematic relation with the outcomes. More importantly, in Step 2, results showed that of the 12 investigated interaction-terms, only one was significant.[4] Specifically, explicit autonomy desire moderated the relation between explicit autonomy satisfaction and ill-being. This interaction was further examined by means of simple slope analyses (Hayes & Matthes, 2009; see also Study 1). Similar to Figure 1b, autonomy satisfaction related negatively to ill-being among individuals high in autonomy desire ($\beta = -.29$; $t = -3.76$; $p < .001$), but not among those low in autonomy desire ($\beta = -.08$; $t = -0.97$; $p > .05$).

Supplementary Analyses

Similar to Study 1, we examined the unique effects of need satisfaction and need frustration in the prediction of either well- or ill-being. We ran four additional regression analyses examining autonomy satisfaction and frustration simultaneously, focusing on either explicit or implicit autonomy desire as a moderator, and well- or ill-being as an outcome. The results revealed two interesting patterns. First, while autonomy satisfaction significantly predicted well-being (yet only in the model including explicit but not implicit desire) but not ill-being, autonomy frustration related to ill-being but not well-being. Second, none of the interactions reached significance.

[4] Additional hierarchical regression analyses with the separate indicators of well-being (i.e., vitality and quality of life) and ill-being (i.e., anxiety and aggression) as outcomes showed that only one interaction of the 24 investigated interactions was significant. That is, the relation between autonomy frustration and aggression was stronger for those individuals scoring low on implicit autonomy desire.

Table 4

Hierarchical Regression Analyses with Autonomy Satisfaction or Autonomy Frustration, Explicit Autonomy Desire (Left Panel) or Implicit Autonomy Desire (Right Panel), and their Interaction Predicting Well-being and Ill-being (Study 2)

	Explicit Autonomy Desire				Implicit Autonomy Desire			
	Well-being		Ill-being		Well-being		Ill-being	
	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β
Autonomy satisfaction (E)	.29***	.30***	-.23**	-.23**	.20*	.20*	-.19*	-.20*
Autonomy desire	-.09	-.10	.15*	.12	.06	.07	-.04	-.03
Interaction		-.04		-.15*		.03		.05
ΔR^2	.09	.00	.07	.02	.04	.00	.04	.00
F for R^2 change	7.33**	0.27	6.60**	3.98*	2.58	0.07	2.51	0.32
Autonomy frustration (E)	-.27**	-.26**	.38***	.36***	-.24*	-.23*	.44***	.45***
Autonomy desire	-.02	-.03	.05	.07	.08	.11	-.05	-.03
Interaction		-.03		.06		-.14		-.11
ΔR^2	.07	.00	.14	.00	.05	.02	.16	.01
F for R^2 change	5.74**	0.15	15.18***	0.59	3.44*	2.08	14.15***	1.57
Autonomy satisfaction (I)	.05	.05	-.13	-.14	.07	.07	-.18	-.20*
Autonomy desire	-.09	-.11	.15*	.15	.13	.13	-.07	-.06
Interaction		-.17		-.09		.01		.08
ΔR^2	.01	.02	.04	.01	.02	.00	.03	.01
F for R^2 change	0.75	3.67	3.14*	1.12	1.03	0.01	2.14	0.73

Note. E = Explicit measure; I = Implicit measure. *p < .05. **p < .01. ***p < .001.

Brief Discussion

In line with our first hypothesis, we found that autonomy satisfaction, as explicitly reported by prisoners, related positively to their well-being and negatively to their ill-being, while autonomy frustration showed an opposite pattern. This clear pattern of findings did not emerge for implicit autonomy satisfaction as it related only minimally to prisoners' well- and ill-being. Further, the pattern for autonomy desire was much less clear-cut, with explicit autonomy desire relating only positively to ill-being and implicit autonomy desire being unrelated to both well- and ill-being. More importantly, with regard to our second hypothesis, results showed only one of 12 interaction effects was significant. Different from Study 1, this interaction suggested that autonomy need satisfaction *only* related negatively to prisoners' ill-being among those expressing an explicit desire for autonomy. Yet, when both autonomy satisfaction and frustration were entered simultaneously, this interaction was no longer significant.

General Discussion

According to Self-Determination Theory's universalistic assumption, individuals should benefit or suffer from experiences of, respectively, autonomy satisfaction or frustration even if they do not strongly value or desire getting this meet met (Deci & Ryan, 2000). From a Dispositional Motive Perspective, however, one would expect that individuals who attach greater importance to or experience a higher desire for autonomy (compared to those individuals scoring low on these constructs) are more or even only susceptible for both the beneficial and harmful effects of, respectively, need-satisfying and need-frustrating experiences (McClelland, 1965). As previous studies have provided inconsistent results and mostly focused on the needs for competence and relatedness, we examined herein the moderating role of autonomy strength across two samples, thereby making use of both explicit and implicit measures of need strength.

The Need for Autonomy and Psychological Functioning

In line with our first hypothesis, we found that explicitly assessed autonomy satisfaction related positively to well-being and negatively to ill-being, while explicit autonomy frustration showed an opposite pattern of results. When both predictors were entered simultaneously in a set of supplementary analyses, need satisfaction was primarily predictive of well-being, while need frustration related more strongly to ill-being, a finding generally consistent with the proposed dual-path model (e.g., Bartholomew et al., 2011; Vansteenkiste & Ryan, 2013). These results were obtained relatively independent of the interaction effects, meaning that the effects of autonomy satisfaction and frustration on well- and ill-being were present for individuals both high and low in autonomy strength (with one exception in Study 2). With regard to implicitly assessed autonomy satisfaction, there was only a significant negative relation with ill-being, but no relation with well-being.

Across both studies, explicit (but not implicit) autonomy desire was found to be positively related to ill-being, and unrelated to well-being. Notably, the need desire – ill-being relation may also be interpreted the other way around, with need desire being rooted in ill-being. Such an interpretation would be congruent with past work by Sheldon and Gunz (2009), who reported need desire to be rooted in need frustration. Interestingly, need valuation, which was unrelated to need desire, yielded an opposite pattern of correlates with the outcomes. That is, in Study 1, autonomy valuation related positively to well-being and negatively to ill-being. Also, need valuation correlated positively with need satisfaction and negatively with need frustration, a pattern markedly different from the one observed for need desire. Presumably, due to the benefits accompanying need-satisfying experience one may come to value the need itself more and even be more sensitive for new opportunities to derive need satisfaction (Moller, Deci, & Elliot, 2010). Further, in Study 2, we found that explicit and implicit autonomy desire were unrelated. This is in line with previous studies finding no or only a moderate

relation between explicit and implicit measures of need strength (McClelland et al., 1989; Schüler et al., 2016).

Overall, the lack of relation between both operationalizations of need strength and their different relation with need-based experiences, well- and ill-being indicate that both cannot be collapsed under the umbrella term of need strength. Both indicators of need strength may be rooted in different socialization experiences, an issue that deserves greater attention.

The Moderating Role of Autonomy Desire and Valuation

In line with our second hypothesis, we found in general only a modest moderating role of autonomy strength in the relations between autonomy satisfaction and frustration on the one hand, and well- and ill-being on the other. More specifically, whereas in Study 1 four out of the eight investigated interaction-terms were significant, only one out of the twelve were significant in Study 2. Thus, across both studies, 25% of the interaction effects were significant. In addition, it must be noted that the additional explained variance of these interactions was rather low across both studies (ΔR^2 ranged between .01 and .04).

Further, in Study 1 (but not in Study 2), we found that even those scoring low on autonomy strength benefitted from autonomy satisfaction or suffered from autonomy frustration (i.e., their slopes were significant). This indicates that, overall, even though the effects of autonomy-related experiences can be stronger for individuals with a stronger preference for autonomy, individuals with a low preference are still affected by these experiences. Moreover, additional analyses in both studies indicated that when examining satisfaction and frustration effects simultaneously, the interaction terms with need strength were no longer significant. All significant interaction-terms were in accordance with the Motive Disposition Theory, indicating that individuals with a stronger preference for autonomy benefitted or suffered more from, respectively, need-satisfying or need-frustrating experiences (Schultheiss, 2008).

A few other findings are noteworthy. First, most of the significant interactions were observed in Study 1 rather than Study 2. This could be due to the high mean level of explicit autonomy desire and the rather low observed variance in this construct in the prisoner sample in Study 2, which makes it more difficult to find significant interactions. Second, five out of the six significant interactions across both studies involved explicit autonomy desire (and one involved autonomy valuation). This indicates that individual differences in explicitly assessed autonomy desire are more likely to moderate the effects of need-related experiences than such differences in autonomy valuation. Such findings suggest that 'bad' (i.e., desire for autonomy) may be stronger than 'good' (i.e., valuation of autonomy) in regulating the effects of need satisfaction and frustration on well- and ill-being (cf., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). Additionally, in contrast with previous studies finding no significant moderating role of explicit need strength (e.g., Schüler et al., 2016), we only found such effects for the explicit but not the implicit measure. Future studies could further delineate the specific (though probably limited) impact of explicit and implicit need desire and need valuation in the associations between need-related events and well- or ill-being.

Limitations and Directions for Future Studies

This study had several limitations. First, we employed a cross-sectional non-experimental design, which precludes the possibility of making causal statements. Future longitudinal and experimental studies are needed to shed more light on the temporal interplay between our study variables. Such studies could, for example, manipulate the degree of autonomy strength and then expose individuals to either an autonomy-satisfying or -frustrating event and, subsequently, assess individuals' current psychological functioning. Second, although the inclusion of implicit measures in Study 2 was definitely a strength and these measures were found to be reliable, we found that whereas implicit autonomy satisfaction related weakly to the other study variables, implicit autonomy desire was unrelated to all of them. This weak relation between the implicit measures and the other study

variables is perhaps due to the explicit and cognitive nature of the other variables. Indeed, because implicit measures are especially valuable when predicting behavior occurring under reduced cognitive capacity (Gawronski, 2009), it would be interesting to investigate whether implicit competence satisfaction and desire predict spontaneous behaviors or behaviors that are conducted under pressure. Additionally, future studies on the moderating role of competence and relatedness strength are needed, as studies with respect to these needs have also provided inconsistent results (e.g., Chen et al., 2015; Schüler & Kuster, 2011).

Conclusion

Across two studies, we found that, overall, increased autonomy satisfaction and reduced autonomy frustration are crucial for individuals' optimal psychological functioning, regardless of the role of autonomy strength. Additionally, the role of autonomy strength and especially autonomy desire in these relations was in line with a dispositional motivational approach, but was rather limited in size. Yet, the current findings are also in line with SDT's universalistic assumption indicating the universal benefits of need satisfaction and the universal costs of need frustration for individuals' well- and ill-being.

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On the Integration of Need-related Autobiographical Memories among Late Adolescents and Late Adults: The Role of Depressive Symptoms and Self-congruence[1]

Within Self-Determination Theory, integration denotes the process through which people accept past and present experiences and harmonize these experiences within their sense of self. We investigated associations between indicators of successful and poor integration of need-related memories and memory-related affect. We also examined the role of depressive symptoms and self-congruence as antecedents of these indicators. Moreover, we investigated whether late adults, compared with late adolescents, were better capable of integrating need-frustrating memories through higher levels of self-congruence. Participants were 132 late adolescents (*M*age = 17.83) and 147 late adults (*M*age = 76.13), who reported on their level of depressive symptoms and self-congruence. Next, participants generated a need-satisfying and need- frustrating memory and reported on the memories' integration (in terms of acceptance, connection and rumination) and associated affect. Whereas depressive symptoms related mainly to the poor integration of need-frustrating memories, self-congruence related positively to the integration of both need-satisfying and need-frustrating memories. In turn, integration was related to more positive and less negative affect. Late adults scored higher than late adolescents on the integration of need-frustrating memories, an effect that was partly accounted for by late adults' elevated self-congruence. Results suggest that self-congruence, depressive symptoms and age play a role in the integration of need-based autobiographical memories.

[1] Van der Kaap-Deeder, J., Vansteenkiste, M., Van Petegem, S., Raes, F., & Soenens, B. (2016). On the integration of need-related autobiographical memories among late adolescents and late adults: The role of depressive symptoms and self-congruence. *European Journal of Personality*. doi: 10.1002/per.2079

Introduction

According to Self-Determination Theory (SDT; Deci & Ryan, 2000; Vansteenkiste, Niemiec, & Soenens, 2010), a broad theory on human motivation and socialization, the integration of past positive and negative experiences is crucial for individuals' current adaptive psychological functioning and thriving. Consistent with developmental theories such as Erikson's (1950) model of psychosocial development, SDT argues that coming to terms with negative experiences from the past and building an identity containing both positive and negative past experiences represent a crucial task throughout the lifespan.

Extant research on the integration of one's past experiences has focused either on indicators of high-quality integration (e.g. acceptance; Weinstein, Deci, & Ryan, 2011) or on indicators of poor integration (e.g. rumination; Mclaughlin, Borkovec, & Sibrava, 2007). Accordingly, a first aim of the present study was to examine indicators of both high-quality integration and poor integration in conjunction, and their relation with individuals' current affect concerning these past experiences. In doing so, we focused specifically on memories related to both the satisfaction and the frustration of the psychological needs for autonomy (i.e. experience of volition), competence (i.e. experience of effectiveness) and relatedness (i.e. experience of closeness), as these have been found to represent a crucial aspect of autobiographical memories (for an overview see Milyavskaya, Philippe, & Koestner, 2013). The second aim was to investigate whether personal characteristics would relate to individuals' degree of integration of past events. Specifically, we examined associations with depressive symptoms and self-congruence (i.e. experiencing oneself as the author of one's behaviours; Weinstein, Przybylski, & Ryan, 2013). Finally, although previous research has indicated that people become better capable of integrating (especially negative) past events as they grow older (e.g. Torges, Stewart, & Nolen-Hoeksema, 2008), the exact mechanism behind this developmental trend is less clear. Therefore, in the current mixed age group involving both late adolescents and late adults, we examined whether older

individuals' higher display of self-congruent functioning (e.g. Sheldon & Kasser, 2001) may be a possible mechanism.

The Integration of Autobiographical Memories

The integrative process is a central aspect of many theories of personality development (e.g. Rogers, 1963) and autobiographical memory (e.g. Bauer, McAdams, & Pals, 2008; Pillemer, 1992). In this study, we drew upon SDT (Deci & Ryan, 2000; Ryan, 1995), where integration is defined as the process through which people acknowledge and come to accept various aspects (i.e. emotions, behaviours and cognitions) of their past, present and future functioning, and bring these aspects into harmony to form a unified sense of self (Deci & Ryan, 2000; Weinstein et al., 2013). This integrative process comes into play when individuals are confronted with past experiences that are at odds with one another or that are inconsistent with personally held ideals and values. Such a confrontation challenges individuals to integrate past experiences into a coherent whole. To illustrate, an experience of social exclusion may threaten a person's worldview that the world is trustworthy, an experience that needs to be acknowledged and integrated. The failure to do so may cause internal conflict, which then may manifest through rumination about the event. However, this process of integration can be painful because the full acknowledgement of negative memories may elicit feelings of sadness, fear and anger (Mills & D'Mello, 2014). In addition, also positive and rewarding experiences need to be assimilated within one's sense of self. In other words, this integrative process involves both positive and negative experiences, which together should nourish the formation of a meaningful and coherent life narrative (Bauer et al., 2008). Indeed, people with life narratives that include both positive and negative past events were found to experience greater overall well-being (e.g. McLean & Lilgendahl, 2008) and to have clearer goals for the future (e.g. Pillemer & Kuwabara, 2012).

In the present study, we focused on two indicators of adaptive integrative processing, namely, acceptance of past events and the degree to which one feels connected with oneself as a person when the event took place. To the extent that people accept a past event and feel a bond with the person they

were at the time of the event, it indicates that the event has gained a more meaningful place within their personal life narrative. Weinstein et al. (2011; Study 5) asked students to reflect on a negative (i.e. shameful or regretful) or positive (i.e. a happy or contented) life event that had a strong impact on them, thereby indicating their acceptance of and connection with this event. Integration of both the positive and negative event, as indicated by greater acceptance and connection, was related to higher well-being (Weinstein et al., 2011).

The integrative process can also go awry. Two indicators of poor integration are rumination and intrusion. Whereas rumination refers to the tendency to think repetitively about one's feelings and problems (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008), intrusions refer to the involuntary recollection of past negative events (Brewin, 1998). Both phenomena have been found to mutually reinforce one another (e.g. Smets, Wessel, Schreurs, & Raes, 2012) and are both related to negative emotional outcomes (e.g. Mclaughlin et al., 2007; Michael, Ehlers, Halligan, & Clark, 2005).

Studies thus far have focused almost exclusively either on indicators of successful integration (e.g. acceptance; Weinstein et al., 2011) or on variables indicative of poor integration (e.g. rumination; Mclaughlin et al., 2007). A simultaneous examination of both sides is needed to get a more complete view on the integrative process, as the absence of poor integration does not by definition imply the presence of adaptive integration. To illustrate, a person who does not ruminate over a negative event (i.e. displaying an absence of poor integration) does not necessarily fully accept this event. Therefore, we examined both indicators of successful and poor integration and their relation with memory-related affect. We thereby examined the integration of experiences of need satisfaction and need frustration specifically, because such experiences would be vitally important to individuals' well-being.

Psychological Need Satisfaction and Need Frustration in Autobiographical Memories

A central tenet in SDT is that individuals' well-being largely depends on the satisfaction of their psychological needs of autonomy, competence and relatedness (Deci & Ryan, 2000; Vansteenkiste et al., 2010). Autonomy refers to the degree to which one experiences a sense of choice and volition when

carrying out activities. Competence signifies the tendency to develop one's skills and to gain a sense of control over desired outcomes. Relatedness entails the inclination to connect to other people and to have loving and trustworthy relationships. While satisfaction of these psychological needs has been found to relate positively to a variety of beneficial outcomes (e.g. life satisfaction and vitality), their frustration has been found to relate to negative outcomes (e.g. anxiety and aggression; Chen et al., 2015; Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013).

Recent research also suggests that need satisfaction and frustration play an important role in people's memories of past personal events. A number of studies examined people's experienced need satisfaction at the episodic level and found that participants' need satisfaction, as experienced in their memories, contributed uniquely to their well-being, above and beyond the contribution of people's concurrent need satisfaction (e.g. Philippe, Koestner, Beaulieu-Pelletier, Lecours, & Lekes, 2012). Similarly, need satisfaction as experienced in couple-related memories predicted relationship quality 1 year later (Philippe, Koestner, & Lekes, 2013), whereas need frustration in a loss-related memory (i.e. the loss of something or someone important) was related to more depressive emotions (Philippe, Koestner, Lecours, Beaulieu-Pelletier, & Bois, 2011). Thus, need satisfaction and frustration represent important and unique aspects of individuals' autobiographical memories that help to explain why recalling such memories engenders positive or negative feelings (cf. Philippe et al., 2012). We aim to examine whether the extent to which both need-satisfying (NSM) and need-frustrating memories (NFM) engender positive or negative feelings depends on the degree to which individuals have integrated or failed to integrate these past events.

The Role of Depressive Symptoms and Self-congruence in the Integrative Process

As the integration of past events is crucial for individuals' psychological functioning, we sought to examine whether and how two potentially relevant individual difference variables, namely, depressive symptoms and self-congruence, may relate to the integration of need-satisfying and need-frustrating autobiographical memories. Depression has been characterized as a disorder involving

disturbances in one's reflections of the past (Beck, Rush, Shaw, & Emery, 1979). Depressed individuals retrieve negative memories more frequently and, at the same time, are affected more strongly by this recollection of negative past events (Watkins, Grimm, Whitney, & Brown, 2005). This increased sensitivity to negative past events can be explained by the fact that individuals with elevated depressive symptoms or diagnosed with depression are more prone to intrusions of stressful memories (Brewin, Reynolds, & Tata, 1999) and are more likely to ruminate over past negative events (Watkins & Teasdale, 2001), suggesting that they often fail to integrate past negative or stressful events. A few studies have also focused on positive memories and found that individuals high on depressive symptoms identify less with such memories (e.g. Lemogne et al., 2006; Werner-Seidler & Moulds, 2012). For example, Janssen, Hearne and Takarangi (2015) found that depressive symptoms were related to a stronger feeling of distance from positive past events. Depression thus seems to be characterized by a repetitive dwelling on negative memories and a feeling of detachment from positive memories.

Whereas most studies on autobiographical memories have focused on vulnerability factors (e.g. depressive symptoms) for a poor integration of past events, we additionally focused on a potentially integration-promoting factor, that is, self-congruence. Self-congruence refers to individuals' tendency to regulate their behaviour on the basis of personally endorsed values, interests and preferences, rather than on the basis of externally imposed expectations (Weinstein et al., 2013). Self-congruent functioning is related to desirable outcomes, including higher psychological need satisfaction, greater acceptance of one's strengths and weaknesses, and higher well-being (Weinstein, Przybylski, & Ryan, 2012; Yu, Assor, & Liu, 2015).

As individuals high in self-congruence are aware of their own most fundamental values and interests, they have a clear criterion to evaluate and reflect upon important life events. As such, this awareness is likely to facilitate the assimilation of past life experiences into a coherent and meaningful sense of self (i.e. the process of integration). In addition, people high on self-congruence have been

shown to be open to and interested in their own experiences and to take responsibility for their own actions (Weinstein et al., 2012). For these reasons, we expected that these individuals would be better capable of integrating both positive and negative past events. Although no study thus far investigated directly the relation between self-congruence and the integration of past events, indirect evidence was provided by Weinstein et al. (2011). They found that an autonomous personality orientation, a concept closely aligned with the notion of self-congruence, was positively related to the integration of central positive and negative life events.

Age and the Integration of Autobiographical Memories: The Role of Self-congruence

Erikson (1950) identified the achievement of a sense of ego-integrity as the central developmental task of late adulthood. When achieving ego-integrity, people experience a sense of unity, harmony and completeness in their identity. Key to the successful resolution of this task is an exploration and contemplation of life as a whole and a capacity to reconcile positive and negative past events. This is also in line with socioemotional selectivity theory (Carstensen, Fung, & Charles, 2003), which states that, as people get older, they become more skilled in enhancing their current well-being, for example, by reappraising negative events and by remembering positive stimuli better than negative stimuli (for an overview, see Mather & Carstensen, 2005).

From these theories, it can be derived that late adults, compared with younger people, would be better at integrating past events. Research has shown that late adults indeed display a better integration of memories and of negative memories in particular. To illustrate, older, relative to younger, individuals reported memories that contained more statements about what the memory has taught the individual about the self or the world (e.g. Singer, Rexhaj, & Baddeley, 2007), which provides indirect evidence for the idea that they better accept the memory. Further, Torges et al. (2008) found that older (compared with younger) individuals were better able at accepting mistakes they had made towards a deceased loved one, with such acceptance relating to higher levels of well-being.

Although previous studies indicated that older individuals are better capable of integrating past events, the mechanisms behind this relation are less clear. SDT predicts that, as individuals grow older, they move towards higher levels of self-congruence, indicating that individuals act more according to personally endorsed values (Deci & Ryan, 2000). A number of studies have shown that people indeed display more self-congruent functioning with increasing age. For instance, older individuals have been found to feel more autonomous while voting, tipping and paying taxes (Sheldon, Kasser, Houser-Marko, Jones, & Turban, 2005) and more often strive for personally important and self-determined goals (Sheldon & Kasser, 2001). Older individuals were also found to attach less importance to extrinsic goals (e.g. status), that is, goals characterized by a focus on others' approval and by a lack of self-congruence (Kasser & Ryan, 1996). Based on this evidence, we expected that higher levels of self-congruence would explain, in part, why older individuals would be better at integrating past events.

The Present Study

The overall goal of this study was to investigate whether the integration of need-related memories relates to individuals' currently experienced positive and negative affect with respect to these memories. We reasoned that, when a personal memory event still elicits negative affect today, there is a remaining scar and the event has not been fully processed and accepted yet. In contrast, when the event comes with more positive affect today, it has been processed more fully and more adequately. Thus, we expected that high-quality integration of past events would relate to positive affect and that poor integration would relate to negative affect. We also examined whether depressive symptoms, self-congruence and age would relate to this integrative process.

Specifically, the following three hypotheses were examined in a mixed sample of late adolescents and late adults. First, we examined to what extent different indicators of high-quality integration (i.e. connection and acceptance) and poor integration (i.e. rumination and intrusion) related to individuals' memory-related affect (Hypothesis 1). As need satisfaction and frustration represent

crucial aspects of autobiographical memories (Milyavskaya et al., 2013), we focused on memories involving experiences of both need satisfaction and need frustration. We expected that connection to and acceptance of both NSM and NFM would relate to more positive and less negative affect, whereas an opposite pattern was expected for rumination and intrusions (which were only assessed with respect to the NFM).

Second, we investigated whether depressive symptoms and self-congruence related to this integrative process. We expected that self-congruence would relate to more positive and less negative affect, with better integration (as indicated by higher levels of connection and acceptance, and lower levels of rumination and intrusions) of both NSM and NFM accounting for this association (i.e. mediation). An opposite pattern of results was anticipated with regard to depressive symptoms (Hypothesis 2).

The sampling of a mixed age-group, involving both late adolescents and late adults, allowed us to investigate the role of age in two different ways. First, we examined whether the proposed theoretical model would hold across both late adolescents and late adults (Hypothesis 3a). Second, in terms of mean-level differences, we expected late adults to display more acceptance and connection and less rumination and intrusions than late adolescents, with this age difference being accounted for by the presence of higher levels of self-congruence among elderly people (Hypothesis 3b).

Method

Participants and procedure

Participants were late adolescents (N = 132; Mage = 17.83; SD = .94; range: 16–22 years) and late adults (N = 147; Mage = 76.13; SD = 7.57; range: 61–93 years). In both groups, there were slightly more women than men (late adolescents: 56.1%; elderly individuals: 66.0%). Of the late adolescents, 65 were first-year undergraduate students in psychology, and 67 were sixth-grade high school

students.[2] All high school students were following an academic track (i.e. a track that prepares them for higher education). Among the elderly people, the highest level of education obtained was 17.4% primary school, 59.1% high school and 23.6% higher education.

Both the late adolescents and the late adults were recruited by undergraduate students in return for course credits. These students received a 1-h information session about the purpose of the study and the recruitment procedures to ensure that participants would be recruited in a standardized way. With respect to the late adults, students were asked to search for individuals of at least 65 years old who were willing to participate in the study. After informing participants that participation was voluntary, that they could withdraw their participation at any moment and that the data would be processed in a confidential way, undergraduate students were present to provide, if needed, assistance when participants were filling out the questionnaires.

We decided to let the participants first fill out the general questionnaires and subsequently the memory-related questionnaires because this order of presentation has been found to be most methodologically sound (Philippe, Bouizegarene, Guilbault, Rajotte, & Houle, 2015). With a reversed order of presentation, there is a greater likelihood that ratings on the general questionnaires (depression and self-congruence) will be affected by the valence of the retrieved memories. Thus, participants first filled out questionnaires assessing depressive symptoms and self-congruence. Next, participants were instructed to think of two need-related memories. We used a mixed design with the type of need-related memory (i.e. autonomy, competence or relatedness) representing a between-subject factor and with the valence of the memory (i.e. satisfaction or frustration) being a within-subject factor. Younger and older participants were distributed equally over the three between-subject conditions, χ^2 (2, N = 274) = .16, p = .92. In counterbalanced order, all participants were asked to generate one satisfying and one

[2] Results of independent samples *t*-tests indicated that there were no mean-level differences with respect to the outcome variables between the high school and undergraduate students (*t*-values ranging between -1.70 and 1.49, $p > .05$).

frustrating memory, which related to a single need.[3] Specifically, participants were instructed to think back to and shortly describe an event wherein they felt free to do things that were congruent with their personal interests and values (i.e. autonomy satisfaction condition), or successful in doing something that was important to them (i.e. competence satisfaction condition), or connected to other people who were important to them (i.e. relatedness satisfaction condition). Then, they generated an event during which they felt forced to act or think in a particular way (i.e. autonomy frustration condition), or as if they failed in something that was important to them (i.e. competence frustration condition), or rejected or excluded by people who were important to them (i.e. relatedness frustration condition). The instructions also stated that this event needed to be personally important to them. We have provided some examples of the recalled memories in Table 1. After this short description, participants filled out questionnaires tapping into memory-related experiences, as explained in the succeeding discussion.

[3] Results of a MANOVA showed that the order of the retrieved memory (i.e. reporting first on either a need-satisfying or need-frustrating memory), which was entered as a between-subject factor, did not affect the degree of experienced autonomy, competence, and relatedness satisfaction and frustration in the reported memory ($F(6, 251) = .89$, $p > .05$, $\eta^2 = .02$).

Table 1

Examples of the Recalled Memories

Type of memory	Example	Reporter
Autonomy satisfaction	"My parents were always very strict about everything. I could make only a few decisions by myself. But when my godmother went to talk with my parents about going to the university, I was allowed to make my own decisions for the first time. As soon as I went to university, I really had a feeling of freedom."	Late adult
Competence satisfaction	"When I received an award for Spanish in my last year of high school. Because I had invested a lot of effort and attached a lot of value to it."	Late adolescent
Relatedness satisfaction	"A birthday party where we (I, my husband, children, and grandchildren), went out for a surprise diner and visited an amusement park afterwards. At that moment I was in a wheelchair because of a knee operation. It was winter and it had snowed. The grandchildren liked it a lot to guide me in my wheelchair through the park in the snow. I'm really grateful for this beautiful memory."	Late adult
Autonomy frustration	"In the fourth year of high school I followed the track 'Latin-Mathematics'. I had chosen this track because I wanted to give it a try. When I wanted to change my track a year later, my father did not allow this. So I did this track another half year against my will. Eventually I changed my track without my father knowing."	Late adolescent
Competence frustration	"At a certain moment I had a big fight with my son. Today, I feel like I was too rude towards him. I had beaten him, something I had never done before. At that moment I felt like a failure because I was unable to control my anger."	Late adult
Relatedness frustration	"I was in the same class as both my best friends and my romantic partner. My friends thought that my partner changed me. During our last 100 days in the final year of high school they ran out on me and did not support me anymore. My partner did not understand that this rejection hurt me."	Late adolescent

Measures

All items were answered on a Likert scale ranging from 1 (*not at all true*) to 5 (*completely true*), unless indicated otherwise.

General Measures

Depressive Symptoms. Participants were administered the Center for Epidemiological Studies-Depression scale (CES-D; Radloff, 1977) to assess depressive symptoms experienced during the past week. The CES-D has been shown to assess mostly trait instead of state depression and is suitable for non-clinical populations (Spielberger, Ritterband, Reheiser, & Brunner, 2003). We employed a shortened version of the CES-D consisting of six items (e.g. 'I felt depressed'; Van Hiel & Vansteenkiste, 2009). Items were rated on a 4-point Likert scale ranging from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). This scale was reliable ($\alpha = .83$).

Self-congruence. Self-congruence was assessed with the 'authorship/self-congruence' subscale of the index of autonomous functioning (Weinstein et al., 2012). This subscale consists of five items (e.g. 'My decisions represent my most important values and feelings') and was reliable ($\alpha = .80$).

Memory-related Measures

Memory Characteristics: Emotional Intensity and Centrality. Memories can differ in terms of emotional intensity (e.g. Talarico, LaBar, & Rubin, 2004) and centrality to individuals' identity and life story (Berntsen & Rubin, 2006). We measured these features of memories in

order to control for them in the main analyses. Participants were asked to rate the emotional intensity of the event (one item) on a 5-point Likert scale ranging from 1 (*not at all intense*) to 5 (*very intense*). The centrality of the event was measured using four items of the seven-item version of the centrality of event scale (Berntsen & Rubin, 2006). This scale had an adequate reliability (satisfaction memory: $\alpha = .76$; frustration memory: $\alpha = .74$).

Need Satisfaction and Frustration Experienced in the Memory. To obtain a manipulation check and to examine whether participants indeed reported on the need as specified in the instructions, participants were asked to rate the degree of need satisfaction (three items; one per need) and need frustration (three items; one per need) they had experienced during the recalled event. These items were derived from a memory-related psychological need satisfaction scale (Philippe et al., 2011) and from the basic psychological need satisfaction and frustration scale (Chen et al., 2015). Items (e.g. 'I felt free to do things and to think how I wanted'; autonomy satisfaction) were rated on a 5-point Likert scale ranging from 1 (*don't agree at all*) to 5 (*completely agree*). Items assessing need frustration were reverse scored and averaged with the items assessing need satisfaction. This score, which reflects experiences of need satisfaction (versus need frustration), was reliable both for the NSM ($\alpha = .67$) and for the NFM ($\alpha = .66$).

Connection. Participants rated the degree to which they felt connected with the person they were in the memory using four items (e.g. 'I feel connected to the person I was then'), which were taken from Weinstein et al. (2011). This scale had an adequate reliability (satisfaction memory: $\alpha = .76$; frustration memory: $\alpha = .71$).

Acceptance. Acceptance of the reported event was assessed with six items (e.g. 'I accept this event'). These items were adapted from three previously used scales, namely, a scale assessing acceptance of a central past life event (Weinstein et al., 2011), the acceptance subscale of the Illness Cognition Questionnaire assessing the acceptance of an illness (Evers et al., 2001) and the acceptance subscale of the Cognitive Emotion Regulation Questionnaire assessing acceptance of a negative event (Garnefski, Kraaij, & Spinhoven, 2001). This scale was reliable (satisfaction memory: $\alpha = .79$; frustration memory: $\alpha = .87$).

Rumination and Intrusions. Rumination, which was only assessed with respect to the NFM, was measured with four items (e.g. 'I tend to "ruminate" or dwell over this event') of the 12 item-

rumination subscale of the Rumination-Reflection Questionnaire (Trapnell & Campbell, 1999; Luyckx et al., 2008). Intrusion was assessed with three items (e.g. 'I often think about this event without wanting to do so') of the seven-item intrusion subscale of the impact of event scale (Horowitz, Wilner, & Alvarez, 1979; Brom & Kleber, 1985). Items were selected based on their relevance for past events. As previous studies found rumination and intrusion to often go hand in hand (e.g. Smets et al., 2012) and because these two sets of items were highly correlated in the current study ($r = .77$; $p < .01$), they were averaged to form a composite score, which we refer to as 'rumination'. This scale had a good reliability ($\alpha = .89$).

Positive and Negative Affect. Current positive and negative affect when thinking back to the generated memory was assessed with, respectively, eight (e.g. 'happy') and seven (e.g. 'angry') items, which were partly based on the positive and negative affect schedule (Watson, Clark, & Tellegen, 1988). These items were preceded by the stem 'While thinking back to this event, I feel …' and were rated on a 7-point Likert scale ranging from 1 (*not at all true*) to 7 (*completely true*). The scale assessing positive affect was reliable (satisfaction memory: $\alpha = .88$; frustration memory: $\alpha = .89$), as was the scale for negative affect (satisfaction memory: $\alpha = .84$; frustration memory: $\alpha = .82$).

Plan of analyses

The main hypotheses were examined by modelling three structural path models using MPlus 7 (Muthén & Muthén, 1998–2012) using maximum-likelihood estimation. First, we ran a model with our three indicators of (poor) integration (i.e. connection, acceptance and rumination) as predictors of memory-related affect (positive and negative; cf. Hypothesis 1). Thereby, we allowed variables at the same level to covary. In a second model, we added self-congruence and depressive symptoms as predictors of the indicators of integration (cf. Hypothesis 2). These first two structural models were tested separately for the NSM and for the NFM. As rumination was only assessed for the NFM, this variable was not included in the NSM models. Additionally, for both models, we performed a

multigroup comparison to examine whether the observed associations would be (dis)similar for late adolescents and late adults (cf. Hypothesis 3a). To do so, we compared an unconstrained model, in which all path coefficients were allowed to vary across the two subsamples with a constrained model, in which all path coefficients were set equal across both subsamples. Both models were compared using the difference in chi-square ($\Delta\chi^2$), which should be non-significant, and with the difference in comparative fit index (ΔCFI), which should be lower than .01 (Cheung & Rensvold, 2002) in order to favour the constrained over the unconstrained model. When the model fit was significantly different (which would indicate that the relations were moderated by subsample), we estimated partially constrained models, where we gradually constrained path coefficients, as to determine which specific relations were significantly different across subsamples. Subsequently, we examined by means of MANCOVAs the existence of significant mean-level differences between the adolescent and elderly subsample with regard to the study variables. Finally, in a third and final model, we examined whether subsample (i.e. the adolescent and elderly subsample) related to self-congruence, which in turn would relate to our indicators of integration (cf. Hypothesis 3b). In total, 3.01% of the data was missing. These missing data were missing completely at random, as the normed χ^2/df 164.14/129) was 1.27 (i.e. smaller than the recommended cut-off of 2; Ullman, 2001). Because missing data were missing at random, the use of the full information maximum likelihood procedure was appropriate to estimate missing data (Schafer & Graham, 2002). We employed several indices to evaluate the fit of the path models, namely, the χ^2 test, the CFI, the standardized root mean square residual (SRMR) and the root mean square error of approximation (RMSEA). An acceptable fit was indicated by χ^2/df ratio of 2 or below, CFI values of .95 or above, SRMR values of .08 or below and RMSEA values of .06 or below (Hu & Bentler, 1999; Kline, 2005). To test the significance of indirect effects, we used bootstrapping (using 1000 draws), a nonparametric resampling procedure that is currently highly recommended (Preacher & Hayes, 2008).

Results

Descriptive statistics and preliminary analyses

First, a paired-samples *t*-test indicated that individuals reported more experienced need satisfaction in the need satisfaction condition (M = 4.09; SD = .65) than in the need frustration condition (M = 2.68; SD = .79), $t(261) = 22.67$, $p < .01$.[4] The bivariate correlations between the study variables, separated by subsample, can be found in Table 2. Further, results of two repeated measures ANOVAs with type of memory (i.e., NSM and NFM) as a within-subject factor and with population as a between-subject factor showed that although there was no difference in the emotional intensity between the generated NSM and NFM ($F(1, 259) = .05$, $p > .05$, $\eta^2 = .00$), the two types of memories did differ with respect to centrality ($F(1, 256) = 56.02$, $p < .001$, $\eta^2 = .18$). More specifically, NSM (M = 3.61; SD = .93) were rated to be more central than NFM (M = 3.02; SD = 1.03). The interaction between type of memory and population was non-significant (emotional intensity: $F(1, 259) = 2.29$, $p > .05$, $\eta^2 = .01$; centrality: $F(1, 256) = .44$, $p > .05$, $\eta^2 = .00$). Elderly individuals did report more emotionally intense (NSM: M = 4.38; SD = .97 and NFM: M = 4.24; SD = 1.08) and central memories (NSM: M = 3.82; SD = .91 and NFM: M = 3.17; SD = .98) than late adolescents (intensity: NSM: M = 3.70; SD = 1.02 and NFM: M = 3.81; SD = 1.05; centrality: NSM: M = 3.39; SD = .91 and NFM: M = 2.85; SD = 1.04; $F(1, 259) = 30.76$, $p < .001$, $\eta^2 = .11$ and $F(1, 256) = 17.29$, $p < .001$, $\eta^2 = .06$, respectively).

[4] When entering the type of recalled need-satisfying or need-frustrating memory (i.e. autonomy, competence or relatedness) as a between-subject factor in a MANOVA, participants were found to report more satisfaction or frustration of the need that was specified in the instructions compared with the satisfaction or frustration of the other two needs ($F(12, 502) = 7.89$, $p < .01$, $\eta^2 = .16$).

Table 2

Correlations between the Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Memory characteristics															
1. Emotional intensity - NSM	-	.12	.30**	.02	.09	-.08	.15†	.08	.02	-.05	.07	-.11	-.04	.14	.08
2. Emotional intensity - NFM	.28**	-	.17†	.45**	.00	.29**	-.20*	-.14	.13	-.26**	.55**	-.02	-.32**	.04	.41**
3. Centrality - NSM	.07	.09	-	.17†	.28**	.12	.30**	-.00	.23**	-.02	.23*	.18*	-.05	.04	.03
4. Centrality - NFM	-.09	.09	.12	-	-.19*	.25**	-.11	-.03	-.03	-.23*	.55**	-.08	-.21*	.09	.38**
Personal characteristics															
5. Self-congruence	.09	-.07	.00	.07	-	-.16†	.33**	.16†	.35**	.16†	-.11	.20*	-.02	-.07	-.00
6. Depressive symptoms	-.12	.16†	-.20*	.21*	-.18*	-	-.22*	-.03	.04	-.26**	.42**	.05	-.26**	.05	.34**
Indicators of (poor) integration															
7. Connection with person - NSM	.03	-.03	.24**	-.11	.18*	-.23**	-	.07	.23*	.18*	-.12	.35**	.10	-.20*	-.25**
8. Connection with person - NFM	.07	-.02	.09	.08	.23**	-.16†	.27**	-	.10	-.13	.26**	-.04	.07	-.00	.01
9. Acceptance of event - NSM	.01	.09	.23**	-.04	.29**	-.05	.23**	.20*	-	.20*	.03	.41**	-.07	-.35**	.08
10. Acceptance of event - NFM	.07	-.10	.25**	.02	.27**	-.15†	.18*	.20*	.54**	-	-.58**	-.03	.43**	.04	-.39**
11. Rumination over event - NFM	-.16†	.18*	.06	.48**	-.06	.27**	-.12	.01	-.20*	-.35**	-	.05	-.36**	-.01	.47**
Memory-related affect															
12. Positive affect - NSM	.07	.07	.20*	-.13	.14†	-.05	.17*	.06	.54**	.35**	-.13	-	-.13	-.74**	-.01
13. Positive affect – NFM	-.05	-.15†	.09	.19*	.17†	-.10	.03	.31**	.24**	.39**	-.25**	.08	-	.22*	-.64**
14. Negative affect – NSM	-.05	-.13	-.14†	.15	-.16†	.02	-.18*	.01	-.50**	-.31**	.16†	-.76**	-.02	-	.05
15. Negative affect – NFM	-.01	.12	-.11	-.04	-.19*	.01	-.12	-.11	-.24**	-.33**	.29**	-.05	-.61**	.19*	-

Note. NSM = Need-satisfying memory; NFM = Need-frustrating memory. Elderly individuals' measures are reported below the diagonal while late adolescents' measures are reported above the diagonal. †$p < .10$. *$p < .05$. **$p < .01$.

Finally, independent-samples *t*-tests indicated that men and women differed with respect to depressive symptoms, with women (elderly individuals: $M = .65$; $SD = .62$; late adolescents: $M = .77$; $SD = .64$) experiencing more depressive symptoms than men (elderly individuals: $M = .41$; $SD = .50$; late adolescents: $M = .47$; $SD = .44$), $t(145) = 2.42$, $p < .05$ and $t(130) = 3.04$, $p < .01$. In the adolescent subsample, women experienced less acceptance ($M = 3.51$; $SD = 1.15$), less positive affect ($M = 2.07$; $SD = 1.05$) and more negative affect ($M = 4.80$; $SD = 1.32$) with respect to the NFM than men ($M = 3.87$; $SD = .73$; $M = 2.60$; $SD = 1.06$; $M = 4.27$; $SD = 1.29$, respectively), $t(125) = -2.07$, $p < .05$; $t(127) = -2.83$, $p < .01$; $t(127) = 2.27$, $p < .05$. Given these findings, we controlled for gender, emotional intensity and centrality in our main analyses.

Primary analyses

Hypothesis 1: The Relation between Integration and Memory-related Affect. In a first structural model, we examined the unique relation between the three integration variables and current memory-related positive and negative affect. Both the NSM and the NFM model had a perfect fit because they were fully saturated. As displayed in Figure 1, in line with our expectations, connection and acceptance with respect to both the NSM and NFM were related to more positive affect and less negative affect (although connection only yielded a marginally significant relation with negative affect in the NSM). Rumination about the NFM showed the exact opposite pattern of associations. Then, we performed a multigroup comparison to examine whether the observed associations would be similar for late adolescents and late adults. The constrained model fitted the data equally well as the unconstrained model, both for the NSM ($\Delta\chi^2(5) = 7.32$, $p > .05$ and $\Delta CFI = .01$) and for the NFM ($\Delta\chi^2(7) = 12.24$, $p > .05$ and $\Delta CFI = .02$), suggesting that the observed associations in Figure 1 applied similarly to late adolescents and late adults.

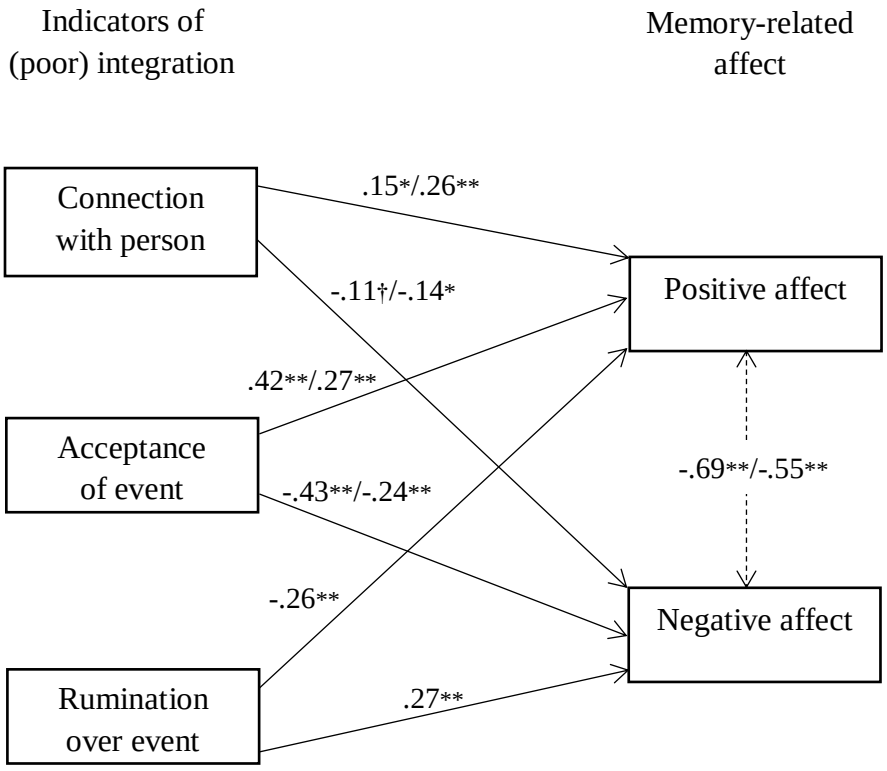

Figure 1. First Structural Model Depicting the Relation between Indicators of (Poor) Integration and Memory-related Affect in Need-Satisfying and Need-Frustrating Memories.

Standardized coefficients appearing before and after the slash refer to, respectively, the need-satisfying and need-frustrating memories. Only one coefficient is reported for the paths relating to rumination, as this construct was only assessed in the need-frustrating memories.

†$p < .10$. *$p < .05$. **$p < .01$.

Hypothesis 2: The Role of Self-congruence and Depressive Symptoms. The second model built upon the first by adding self-congruence and depressive symptoms as predictors of connection, acceptance and rumination.[5] Both the NSM and NFM models had a good fit (NSM: χ^2/df = .40; CFI = 1.00; SRMR= .01; RMSEA= .00; NFM: χ^2/df = .29; CFI = 1.00; SRMR= .01; RMSEA= .00). As displayed in Figure 2, self-congruence related positively to connection and acceptance, both with respect to the NSM and with respect to the NFM, while it was unrelated to rumination in the NFM. The relation between depressive symptoms and integration indicators was mixed and dependent on the type of memory. That is, whereas depressive symptoms related negatively to connection with NSM (but was unrelated to connection with NFM), it related negatively to acceptance of NFM (but was unrelated to acceptance of NSM). Finally, depressive symptoms related positively to rumination over NFM. The relations between the indicators of integration and affect were similar to these relations as observed in the first model.

Next, we allowed in a stepwise fashion direct paths from self-congruence and depressive symptoms to positive and negative affect. None of these direct paths were significant, indicating that self-congruence and depressive symptoms were related to affect only indirectly, through the integration variables. Bootstrapping procedures indicated that, as for self-congruence, the most robust indirect associations were found via acceptance: self-congruence was related indirectly to both positive and negative affect via acceptance, a finding observed in both the NSM (95% CI [.064, .195] for positive affect; 95% CI [-.204, -.068] for negative affect) and NFM (95% CI [.011, .094] for positive affect; 95% CI [-.083, -.006] for negative affect). Additionally, self-congruence also related indirectly to positive affect via connection in the NFM (95% CI [.010, .104]).

[5] When re-analyzing the second structural model this time using either only rumination or intrusion (instead of the averaged score), we found evidence for a similar pattern of findings.

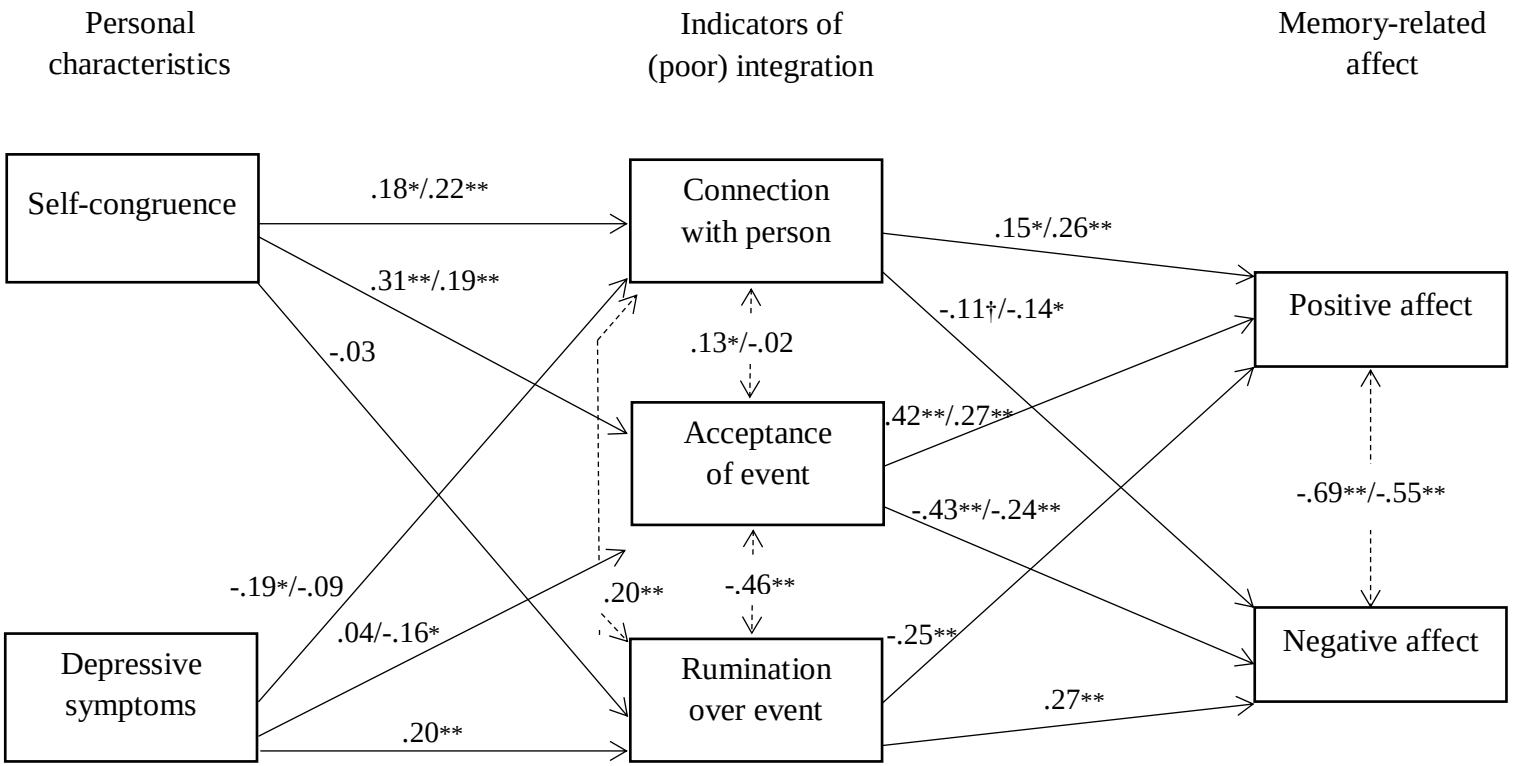

Figure 2. Second Structural Model Depicting the Relation between Personal Characteristics, Indicators of (Poor) Integration, and Memory-related Affect in Need-Satisfying and Need-Frustrating Memories.

Note. Standardized coefficients appearing before and after the slash refer to, respectively, the need-satisfying and need-frustrating memories. Only one coefficient is reported for the paths relating to rumination, as this construct was only assessed in the need-frustrating memories.

†$p < .10$. *$p < .05$. **$p < .01$.

As for depressive symptoms, only the indirect effects for the NFM were significant and were carried by both acceptance and rumination. Specifically, depressive symptoms were related indirectly to negative affect through rumination (95% CI [.008, .099]) and to positive affect through acceptance (95% CI [-.089, -.001]) and rumination (95% CI [-.090, -.008]).

Similar to the first model, we performed a multigroup analysis to examine whether the associations in this second model would be similar for late adolescents and late adults. For the NSM, this was indeed the case as the constrained model fitted the data equally well as the unconstrained model ($\Delta\chi^2(14) = 12.62$, $p > .05$ and $\Delta CFI = .00$). For the NFM, the fit of the unconstrained model was significantly better than the fit of the constrained model ($\Delta\chi^2(20) = 36.47$, $p < .05$ and $\Delta CFI = .03$), but was similar to the fit of a partially constrained model ($\Delta\chi^2$ 17) = 21.98, $p > .05$ and $\Delta CFI = .01$). More specifically, in this latter model, the negative relation between rumination and positive affect was stronger among the elderly individuals ($\beta = -.29$, $p < .01$) than among the late adolescents ($\beta = -.18$, $p < .05$).[6]

Hypothesis 3: The Role of Self-congruence in the Relation between Age Group and Integration. To shed further light on the possible intervening role of self-congruence, we examined whether any age-related differences in integration could be accounted for by self-congruence. First, a series of MANCOVAs (controlling for gender, emotional intensity and centrality) indicated that elderly individuals, when compared with late adolescents, scored higher on self-congruence and reported more connection, greater acceptance, more positive affect and less negative affect with respect to NFM (Table 3). There were no significant mean-level differences between the two age groups with respect to depressive symptoms, integration of the NSM and affect related to the NSM. In a next step, we examined the intervening role of self-congruence in the relation between subsample and integration. As

[6] As connection correlated significantly with acceptance ($r = -.18$, $p > .05$) and rumination ($r = .46$, $p < .01$) among the late adolescents, but not in the elderly individuals (respectively, $r = .12$ and $r = .02$, both $p > .05$), these paths were also unconstrained.

the elderly only displayed greater integration of NFM and as no difference between both subsamples was found with respect to rumination, we limited ourselves to a structural model involving NFM only and including both indicators of high-quality integration (i.e. connection and acceptance).

Specifically, we inserted self-congruence as an intervening variable in the relation between subsample and integration. Additionally, direct paths from subsample to both integration indicators were allowed. Because this model was fully saturated, it had a perfect fit. As illustrated in Figure 3, subsample related positively to self-congruence, with self-congruence, in turn, relating to more connection with and acceptance of NFM. Both indirect relations were significant (connection: 95% CI [.004, .076]; acceptance: 95% CI [.006, .075]). In addition to these indirect effects, subsample also related directly to both connection and acceptance. Thus, elderly individuals displayed better integration, which was partly explained by higher levels of self-congruence.[7]

[7] We performed multigroup analyses based on the type of need (i.e. autonomy, competence and relatedness) addressed in the memory for both Models 2 and 3. These results showed that, in general, the relations in the models were similar across the three need-related memories.

Table 3

Comparison between the Late Adolescents and Elderly Individuals with respect to the Study Variables

	Late adolescents	Elderly individuals	
	M (SD)	*M (SD)*	*F*-value
Personal characteristics			
Self-congruence	3.73 (.55)	3.97 (.57)	13.40**
Depressive symptoms	.64 (.58)	.57 (.59)	1.93
Indicators of (poor) integration			
Connection with person - NSM	3.93 (.84)	3.97 (.87)	.81
Connection with person - NFM	2.95 (.92)	3.44 (.92)	17.81**
Acceptance of event - NSM	4.27 (.59)	4.34 (.71)	.03
Acceptance of event - NFM	3.66 (1.00)	3.92 (.83)	6.94*
Rumination over event - NFM	2.58 (1.13)	2.63 (1.01)	3.23
Memory-related affect			
Positive affect - NSM	5.59 (1.29)	5.51 (1.33)	.91
Positive affect - NFM	2.30 (1.08)	3.05 (1.61)	21.45**
Negative affect - NSM	1.97 (1.10)	2.06 (1.31)	.31
Negative affect - NFM	4.57 (1.33)	3.92 (1.52)	21.56**

Note. NSM = Need-satisfying memory; NFM = Need-frustrating memory.

*$p < .05$. **$p < .01$.

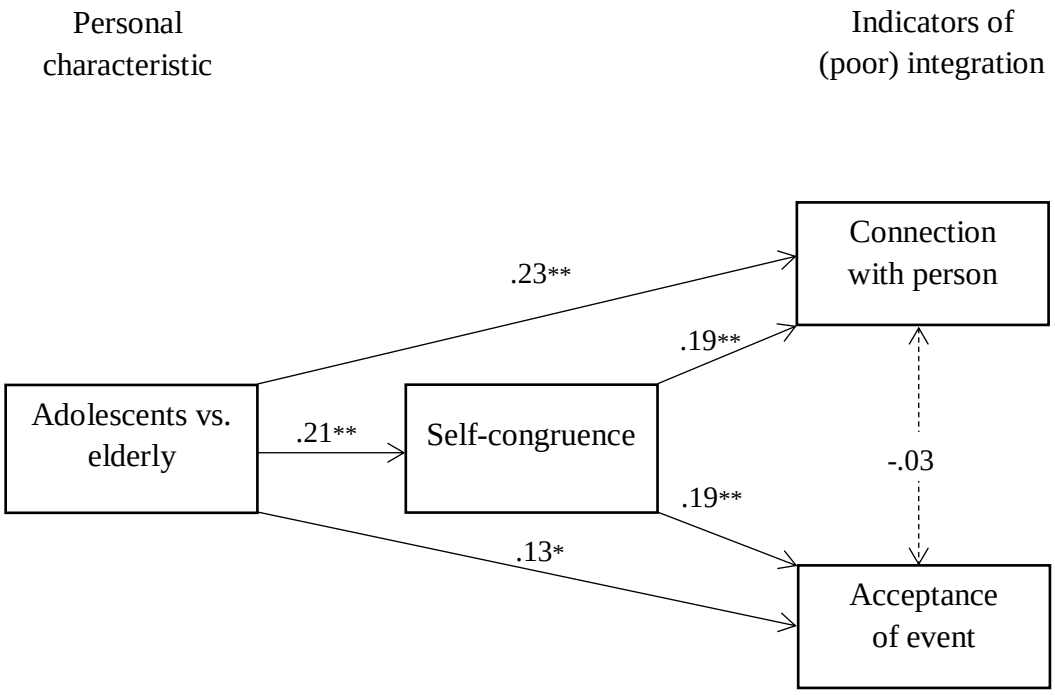

Figure 3. Third Structural Model Depicting the Relation between Subsample, Self-congruence, and Indicators of Integration in Need-Frustrating Memories.

*$p < .05$. **$p < .01$.

Discussion

Several organismic theories in the domains of developmental psychology (Erikson, 1950), clinical psychology (Rogers, 1963), personality psychology (Ryan, 1995) and cognitive psychology (Ehlers & Clark, 2000) highlight the importance of integration, a process involving the acknowledgement of past negative events and the capacity to synthesize these events with positive events into a coherent whole. In spite of its importance, this complex process of integration has only recently begun to receive increasing empirical attention (Weinstein et al., 2011). The general aims of the present study was to study different indicators of both successful and poor integration of need-related positive and negative memories and to examine how these indicators relate to individuals' current positive and negative affect about these memories. Moreover, in addition to investigating the role of a potentially integration-impeding factor (i.e. depressive symptoms), we investigated the role of a personal characteristic hypothesized to foster this process (i.e. self-congruence). Finally, because previous studies (e.g. Singer et al., 2007) have found that elderly people are better capable of integrating (especially negative) memories, we examined whether self-congruence could be part of the mechanism explaining this age-related effect.

Further Insights in the Process of Integration

A contemporary and empirically driven framework that assigns a pivotal role to the process of integration is SDT (Deci & Ryan, 2000). Integration is assigned an important role in individuals' psychological functioning as this process enables them to achieve a greater sense of unity, thereby allowing individuals to function in a more volitional way (Weinstein et al., 2013). Indeed, to experience a full sense of volition and psychological freedom in one's current functioning, one needs to acknowledge and accept both positive and negative past events. Non- synthesized events may come with internal conflict, which may surface through (unwanted) rumination about the event. Previous studies have indicated that the integration of past events, as indicated by higher acceptance, is related to

well-being (Weinstein et al., 2011) and that poor integration of previous events, as indicated by repetitive ruminative thinking, is related to ill-being (Michael et al., 2005). In this study, we aimed to shed a more comprehensive view on the process of integration, by focusing simultaneously on indicators of high-quality integration and poor integration.

Consistent with our hypotheses, we found that both acceptance of the event and experiencing a sense of connection with the person one was at the time of the event were related positively to current positive affect and negatively to current negative affect. These findings were obtained for both the NSM (i.e. positive) and the NFM (i.e. negative) and emerged even after controlling for the emotional salience and the centrality of the recalled event. In contrast, ruminating over NFM was related to less positive and more negative affect.

Although all three indicators related uniquely to both positive and negative memory-related affect, we found that, across both types of memories, acceptance of the event was the most robust predictor (although rumination was equally important in the NFM). Possibly, acceptance may be the most direct indicator of the process of integration, as it indicates that one has currently given the event a meaningful place within one's personally held values, ideals and self-views. That is, acceptance indicates that one takes responsibility for what happened, thereby achieving a greater sense of authorship over the event (see also Erikson, 1950).

Although we focused on the unique contribution of these different indicators of integration, it is likely that in reality they do not function in isolation but are interdependent. For example, acceptance of and rumination over need-frustrating events may reciprocally relate to one another, an issue that could be examined in a longitudinal design. Continuous dwelling over a negative event may preclude its acceptance, whereas a fuller acceptance may lead one to ruminate less about this event. Interestingly, although feeling connected with a negative memory related to more positive affect, it also related to more rumination (although only among late adolescents). The latter relation may make sense

because ruminating over a past event requires thinking back about one's emotions and thoughts at that time, which might come with feelings of connection with one's self in that past event. Future studies could further look into the relations between these different indicators of integration.

These findings have therapeutic implications, as integration of (past) events plays a central role in different treatments. For example, in life review therapy, a central goal is to emotionally process events from one's past (Karel & Hinrichsen, 2000), which has indeed been found to increase well-being (e.g. more life satisfaction; Serrano, Latorre, Gatz, & Montanes, 2004). It is less clear to date what the precise mechanisms underlying this positive effect are and whether it is possible to differentiate between adaptive and maladaptive styles of reminiscence (Karel & Hinrichsen, 2000). Based on the results of this study, treatments involving reminiscence could focus on increasing a style characterized by acceptance and connection, while simultaneously reducing ruminative thoughts. The present findings also fit within acceptance and mindfulness-based interventions, such as acceptance and commitment therapy (Hayes, Strosahl, & Wilson, 1999). Within acceptance and commitment therapy, 'patients are encouraged to embrace unwanted thoughts and feelings – such as anxiety, pain, and guilt – as an alternative to experiential avoidance' and '… to end the struggle with unwanted thoughts and feelings without attempting to change or eliminate them' (Hofmann & Asmundson, 2008, p. 5).

The Role of Depressive Symptomatology and Self-congruence in the Integrative Process

A second goal was to identify personal characteristics that either impede or foster the integrative process. First, we examined the role of depressive symptoms because research has shown that depression is related to rumination and intrusions of negative memories (e.g. Moulds & Krans, 2015) as well as to decreased identification with positive memories (e.g. Lemogne et al., 2006). The present study focused on both types of memories (i.e. negative and positive) and on different aspects of integration (i.e. poor and high-quality integration). Consistent with our hypotheses, we found that depressive symptoms were related to difficulties to integrate NFM and, to a lesser extent, NSM.

Specifically, whereas individuals scoring higher on depressive symptoms were less accepting of and ruminated more over NFM, they reported feeling somewhat less connected with NSM.

As previous studies mostly focused on personal characteristics that impede the integrative process, we focused on a possible protective factor as well, that is, self-congruence. Self-congruence refers to the extent to which individuals regulate their behaviour on the basis of personally held ideals, values and interests (Weinstein et al., 2012; Yu et al., 2015). Much like individuals high in self-congruence take responsibility for their current behaviour, it seems that they also take greater responsibility over past events. Indeed, the current study indicated that self-congruence relates to greater integration of both NSM and NFM. More precisely, individuals high in self-congruence experience a greater sense of connection with the person they were during the event and also have accepted the event itself to a greater degree.

Combining the findings concerning depressive symptoms and self-congruence, there seems to be some evidence for a dual-route model, with one route representing the dark side of the integrative process and with the other route representing the bright side (Vansteenkiste & Ryan, 2013). Whereas depressive symptoms relate to memory-related affect partly through poor integration (i.e. rumination), self-congruence relates to memory-related affect only via high-quality integration (i.e. connection and acceptance). Future research is needed to confirm the distinction between these adaptive and maladaptive paths.

Integration among Late Adolescents and Elderly Individuals

Although previous research has indicated that older individuals display a better integration of memories, and especially of negative ones, compared with younger individuals (e.g. Torges et al., 2008), the mechanism behind this age difference is less clear. Based on SDT's (Deci & Ryan, 2000) and Erikson's (1950) tenet that integrative functioning increases with age and previous studies showing

a higher level of autonomous functioning among older individuals (Sheldon et al., 2005), we proposed that higher levels of self-congruence might enable older individuals to better integrate past events.

First, our findings showed that elderly, when compared with late adolescents, were indeed better capable of integrating past need-frustrating (but not need-satisfying) events. Said differently, the scar of the need-frustrating event was less deep for them, in spite of the fact that they had elicited a more emotionally intense and more central event. Second, we found that these effects were partially accounted for by self-congruence. Because elderly individuals experience their current behaviour to be more congruent with their core values and interests, they seem to gain greater authorship over their past: that is, they reported more feelings of acceptance of and connection to negative past events. However, there remained a direct association between subsample and connection and acceptance, indicating that other mechanisms also may play a role, which could be examined in future studies. One candidate mechanism is older people's selective attention to the benefits of past negative events and to the lessons that can be retrieved from these events (e.g. Mather & Carstensen, 2005).

Limitations and Directions for Future Research

As our study had a cross-sectional design, no causal inferences can be made. This is important because studies have shown that depressive symptoms do not only predict indicators of integration (e.g. rumination), but that these indicators also predict depressive symptoms (Hamlat et al., 2015). Future experimental or longitudinal studies could further shed light on the temporal ordering of, on the one hand, the two personal characteristics examined in this study (i.e. depressive symptoms and self-congruence) and, on the other hand, the indicators of the integration of need-related memories. Additionally, the memory-specific affect ratings by participants could be partially coloured by individuals' global affect. To generate a purer measure of memory-specific affect, future studies could also include a pre-measure of general affect, thereby treating general affect as a covariate in the analyses. Further, we only focused on relatively young individuals (on average 18 years) and elderly

individuals (on average 76 years), thereby excluding a large age group in between these groups, that is, midlife adults. Stewart and Vandewater (1999) argued that conducting a life review at middle age is common and may lead individuals to make minor or even major changes in their life. Even among children, meaning-making of stressful events is apparent (Mossige, Jensen, Gulbrandsen, Reichelt, & Tjersland, 2005). Future studies could, therefore, include additional age groups to get more insight into the life-span development of the integration of need-related memories. Additionally, because participants in the current study provided only a brief account of the memories, it would be interesting for future research to gather (besides questionnaire data) fuller accounts of these memories to enable qualitative coding of integration indicators. Finally, to gain a deeper and more comprehensive understanding of high-quality and poor integration, future studies could include additional integration indicators, such as avoidance (Carvalho, Dinis, Pinto-Gouveia, & Estanqueiro, 2015) and positive interpretation (Lilgendahl & McAdams, 2011).

Conclusion

The present study suggests that integration of past events may play a role in individuals' current functioning and well-being (Deci & Ryan, 2000; Weinstein et al., 2013). The current findings show that self-congruence relates positively to this capacity for integration, while depressive symptoms show a negative relation. This integrative capacity was more present among late adults, which seems at least partially driven by older people's increasing display of self-congruence.

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Evaluative Concerns Perfectionism and Coping with Failure: Effects on Rumination, Avoidance, and Acceptance[1]

Previous research documented associations between evaluative concerns (EC) perfectionism and emotion-focused coping. However, most research was correlational in nature. The present study, therefore, aimed to investigate the relation between EC perfectionism and 3 types of emotion-focused coping in response to experimentally-induced failure. Participants were 72 young adults (*M*age = 21.81; *SD* = 6.44) who took part in a tangram puzzle task and who were assigned to either a failure or success condition. A week after the experimental session, we assessed participants' coping reaction to the failure experience with an online questionnaire tapping into rumination, avoidance, and acceptance of the experience. Results showed that EC perfectionism interacted with the experimental manipulation, such that only individuals high on EC perfectionism displayed more rumination and less acceptance after failure (compared to after success). Additionally, individuals with heightened levels of EC perfectionism reported higher levels of avoidance, regardless of the experimental condition. This study yielded experimental confirmation that individuals high on EC perfectionism are more at risk for rumination about and low acceptance of a failure experience.

[1] Van der Kaap-Deeder, J., Soenens, B., Boone, L., Vandenkerckhove, B., Stemgée, E., & Vansteenkiste, M. (2016). Evaluative concerns perfectionism and coping with failure: Effects on rumination, avoidance, and acceptance. *Personality and Individual Differences, 101*, 114-119. doi: 10.1016/j.paid.2016.05.063

Introduction

Evaluative concerns (EC) perfectionism is characterized by the rigid setting of unrealistically high personal standards and by doubts about one's performance, concerns over makingmistakes, and harsh self-scrutiny (Blatt, 1995; Frost, Marten, Lahart, & Rosenblate, 1990). EC perfectionism has been linked to psychopathology (e.g., eating pathology; Egan, Wade, & Shafran, 2011), pervasive feelings of incompetence (Boone, Vansteenkiste, Soenens, Van der Kaap-Deeder, & Verstuyf, 2014), and academic maladjustment (Blankstein, Dunkley, & Wilson, 2008).

To explain the detrimental effects of EC perfectionism, research has examined how perfectionists cope with stressful events (such as failure) (see Dunkley, Solomon-Krakus, &Moroz, 2015 for an overview). Coping can be defined as ‘efforts to prevent or diminish threat, harm, and loss, or to reduce associated distress’ (Carver & Connor-Smith, 2010, p. 685). Although taxonomies of coping include many types of coping responses (Skinner, Edge, Altman, & Sherwood, 2003), herein we limited ourselves to emotion-focused coping, that is, coping aimed at reducing event-related distress (Carver & Connor-Smith, 2010). Previous research showed that this type of coping is particularly relevant to EC perfectionism (e.g., Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000). Specifically, we focused on rumination, avoidance, and conditional acceptance of life events. Whereas rumination and avoidance aim to reduce event-related distress, respectively, by focusing on negative thoughts (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008) or by escaping the stressful event (Herman-Stahl, Stemmler, & Petersen, 1995), acceptance is aimed at adapting to the stressor (Carver & Connor-Smith, 2010).

Rumination is an emotion-focused coping response whereby individuals try to get more insight into their (dysphoric) mood following an event by repeatedly thinking about the event, without employing active problem solving techniques (Nolen-Hoeksema, 2004). Recently, Flett, Nepon, and Hewitt (2015) proposed the Perfectionism Cognition Theory, which states that perfectionism relates to a host of detrimental outcomes due to rumination, as ruminating prolongs the negative feelings

associated with the negative event. Correlational studies have shown consistently that individuals high on EC perfectionism indeed tend to think and worry more frequently about their daily mistakes (e.g., Frost et al., 1997; James, Verplanken, & Rimes, 2015; Nepon, Flett, Hewitt, & Molnar, 2011).

Another emotion-focused coping response involved in EC perfectionism is avoidance, which is defined as seeking distraction from the stressful situation (e.g., Herman-Stahl et al., 1995). Such an avoidant response among individuals high on EC perfectionism stems from these individuals' tendency to be very concerned with events that may demonstrate their deficiencies (Dunkley, Sanislow, Grilo, & McGlashan, 2006). Many correlational studies indicated a positive relation between EC and avoidance of stressful events and experiences (e.g., Dunkley et al., 2000). For example, Dunkley and Blankstein (2000) found that EC perfectionism related to an avoidant coping style when encountering general, social, and academic hassles in daily life, which, in turn, related to current distress. Additionally, Weiner and Carton (2012) found EC perfectionism to be related to test anxiety via avoidant coping.

Besides rumination and avoidance, we also examined the relation between EC perfectionism and acceptance, that is, an active and more constructive form of coping whereby individuals try to adapt to the stressor and come to terms with the negative event and the emotions involved (Carver & Connor-Smith, 2010). Perfectionists are unlikely to accept negative events because their self-worth is heavily contingent upon experiences of success and failure (Blatt, 1995; Shafran, Cooper, & Fairburn, 2002). Correlational studies indeed suggest that EC perfectionism is related to a tendency to accept oneself only when standards for perfection are met (e.g., DiBartolo, Frost, Chang, LaSota, & Grills, 2004). This conditional self-acceptance likely manifests in an inclination to accept only success but not failure. In line with this reasoning, Stoeber and Janssen (2011) found EC perfectionism to be related to less acceptance of daily mistakes.

In sum, previous studies have shown that EC perfectionism is related to various emotion-focused coping responses. However, these studies almost exclusively relied on correlational designs. An exception is a study by Brown and Kocovski (2014) where EC perfectionism was found to predict

rumination among students who took part in an experimental anxiety-inducing speech task. In line with this study, we also adopted an experimental approach. This was deemed important to further understand the causal role of EC perfectionism and to investigate coping in a more standardized fashion. Specifically, in previous correlational studies, the severity and the intensity of the encountered stressor could have differed between individuals scoring high or low on EC perfectionism. Because individuals high on EC perfectionism have the tendency to generate stressful events (e.g., Dunkley, Zuroff, & Blankstein, 2003), the differential exposure to these stressful events could explain differences in coping responses between individuals scoring high and low on EC perfectionism.

To rule out this alternative possibility, we made use of a standardized stressor by experimentally inducing feelings of failure (and success). This procedure has been used before to investigate the relation between EC perfectionism and emotional reactions to failure, such as anger (e.g., Stoeber, Schneider, Hussain, & Matthews, 2014). However, it has never been used to assess coping responses after failure (compared to success). Because theory (e.g., Blatt, 1995) and research (e.g., Dunkley et al., 2003) suggest that individuals with high levels of EC perfectionism are especially vulnerable to competence-frustrating stressors, we focused specifically on coping responses to failure. We hypothesized that, when encountering failure (instead of success), individuals with high scores on EC perfectionism are more likely to display higher levels of rumination and avoidance, and lower levels of acceptance compared to individuals with low scores on EC perfectionism.

Method

Participants and Procedure

Individuals were invited to participate in this study via a university's online participant panel system in return for course credits or a monetary reward. In total, 72 individuals (61 women) participated (*M*age = 21.81; *SD* = 6.44).

Participation was voluntary and all data were processed confidentially. At the start of the study, which took part in the laboratory, participants gave their written consent and filled out questionnaires concerning demographics and EC perfectionism. Then, participants were asked to perform a Tangram Puzzle Task consisting of seven puzzle pieces that needed to be correctly assembled to form geometric figures. To increase the importance of the task, the puzzle task was described as a test of intelligence. First, the experimenter described and demonstrated the puzzle task. Next, a practice phase was introduced in which all participants were given four minutes to assemble one easy and one difficult figure, followed by the test phase.

In the test phase participants were randomly assigned to either the failure or the success condition (n = 36 in both conditions). Success and failure were induced using a manipulation of standards and difficulty level validated in previous research (e.g., Van der Kaap-Deeder et al., 2016). Individuals were informed that 50% of their peers could assemble one out of five (success condition) or four out of five (failure condition) puzzles correctly in ten minutes. Additionally, the five puzzle assignments given in the success condition were relatively easy in comparison to the ones given in the failure condition. The difficulty of the puzzles was assessed in a pilot test.[2] Thus, success and failure conditions were created by varying both the standard of success and the level of difficulty of the figures. Both in the practice phase and in the test phase, participants were instructed to write down whether they had successfully assembled the puzzle before continuing with the next puzzle. This was done to make the experience of success or failure more salient. When participants solved all the puzzles, or if the ten minutes had passed, the test was finished and all participants were given feedback. In the success and failure condition, individuals were informed that they performed, respectively, better or worse than their peers. Subsequently, the participants were asked to fill out puzzle task-related

[2] To determine the difficulty of the tangram puzzles, we ran a pilot test (among 10 individuals) using 20 different tangram puzzles. Based on the average time needed to solve each puzzle, four relatively easy puzzles (success condition) and four relatively difficult puzzles (failure condition) were chosen. The fifth and last puzzle in both conditions was very difficult, as to not make the puzzle task too easy and to ensure the credibility of the manipulation.

questionnaires. One week later, participants received an e-mail in which they were asked to fill out an online survey which assessed their coping responses with respect to the experimental task. Additionally, participants were asked about their degree of previous experience (before this study) with the Tangram Puzzle Task (ranging between 0 = *no experience* and 4 = *a lot of experience*). Finally, after completing the online questionnaire, all participants received a debriefing which explained the deception of the puzzle task and the corresponding feedback. Ethical approval was obtained from the university's ethical committee.

Measures

All items were answered on a Likert scale ranging from 1 (*not at all true*) to 5 (*completely true*), unless indicated otherwise.

Evaluative Concerns Perfectionism. Two subscales from the Dutch version (Soenens, Vansteenkiste, Luyten, Duriez, & Goossens, 2005) of the Frost-Multidimensional Perfectionism Scale (Frost et al., 1990) were used to measure EC perfectionism, that is, Concerns over Mistakes (9 items, e.g., "People will think less of me if I make a mistake") and Doubts about Actions (4 items, e.g., "It takes me a long time to do something right"). As is common in perfectionism research, scores on both scales were averaged to form a composite measure of EC perfectionism (e.g., Boone et al., 2014) (α = .88).

Manipulation Check Variables. To assess the effectiveness of our manipulation, we assessed incompetence (adapted Competence Frustration subscale of the Basic Psychological Need Satisfaction and Need Frustration scale; Chen et al., 2015; 4 items; e.g., "I have serious doubts about whether I performed well on the puzzle task"; α = .78), negative mood (Negative Affect subscale of the Positive and Negative Affect Schedule; Watson, Clark & Tellegen, 1988; 10 items;e.g., "Angry";α=0.90), and tension (subscale of the Intrinsic Motivation Inventory; Ryan, Koestner, & Deci, 1991; 2 items; e.g., "I felt very tense when making the puzzles"; α = .78), as experienced while assembling the puzzles. Items were rated on a Likert-scale ranging from 1 (*not at all true*) to 7 (*completely true*).

Coping Measures. Three coping responses were assessed. First, rumination over the failure or success experience was assessed with 4 items (e.g., "I tend to 'ruminate' or dwell over this event"; α = .69) from the Rumination subscale of the Rumination-Reflection Questionnaire (Trapnell, & Campbell, 1999). Second, we employed 4 items from the Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979) to assess the degree to which participants tried to avoid thinking about the failure or success experience (e.g., "I try not to think about it"; α = .70). Third, acceptance of the success or failure experience was assessed with 6 items (e.g., "I accept this event"; α = .91). These items were adapted from three previously used scales, namely a scale assessing acceptance of a central past life event (Weinstein, Deci, & Ryan, 2011), a subscale of the Illness Cognition Questionnaire assessing the acceptance of an illness (ICQ; Evers et al., 2001), and a subscale of the Cognitive Emotion Regulation Questionnaire assessing acceptance of a negative event (CERQ; Garnefski, Kraaij, & Spinhoven, 2001).

Results

Descriptive Statistics and Preliminary Analyses

Descriptive statistics and bivariate correlations between the study variables can be found in Table 1. As previous experience with the tangram puzzle was related to some of the study variables, we controlled for this variable in the main analyses. Further, results of independent samples *t*-tests showed that there were no mean-level gender differences in the study variables.

Table 1

Descriptives of and Correlations between the Study Variables

	M (*SD*)	1	2	3	4	5	6	7	8
1. Age	21.81 (6.44)	-							
2. Previous experience with Tangram puzzle	1.25 (.47)	-.08	-						
3. EC perfectionism	2.51 (.70)	-.25*	-.17	-					
Puzzle task									
4. Incompetence	3.01 (1.04)	.04	-.39**	.36**	-				
5. Negative affect	2.27 (.90)	-.18	-.27*	.52***	.61***	-			
6. Tension	4.25 (1.68)	-.04	-.15	.24*	.51***	.70**	-		
Coping response									
7. Rumination	1.85 (.80)	-.08	.03	.38**	.35**	.34**	.27*	-	
8. Avoidance	1.93 (.82)	-.07	-.34**	.42***	.66***	.60***	.27*	.47***	-
9. Acceptance	4.07 (.85)	.09	.06	-.32**	-.40***	-.41***	-.22	-.61***	-.47***

Note. EC = Evaluative concerns. *$p < .05$. **$p < .01$. ***$p < .001$.

We subsequently investigated, by means of two independent samples *t*-tests, whether the randomization of participants across the two conditions was successful by testing mean-level differences in EC perfectionism and previous experience with the Tangram Puzzle Task. Although participants in the success (M = 2.51; SD = 0.73) and failure (M = 2.52; SD = 0.67) condition reported similar levels of EC perfectionism ($t(70)$= -0.07; $p > .05$), individuals in the success condition (M = 1.36; SD = 0.54) reported more experience with tangram puzzles than those in the failure condition (M = 1.14; SD = 0.35) ($t(59.90) = 2.06$; $p = .04$).

To further examine condition-effects we performed two MANCOVA's, one involving the variables assessed immediately after the puzzle task (as a manipulation check) and another involving the coping responses, each time controlling for tangram experience as a covariate. The first MANCOVA indicated that condition had a multivariate effect [$F(3, 67) = 7.07$; $p < 0.001$; $\eta^2 = .24$], with individuals in the failure, relative to those in the success, condition feeling more incompetent, tense, and negative during the puzzle task (see Table 2). However, with respect to the coping responses, the multivariate effect was not significant [$F(3, 67) = 1.89$; $p > 0.05$; $\eta^2 = .08$]. Only an effect on avoidance (and not on rumination or acceptance) was found, with individuals in the failure condition, compared to those in the success condition, reporting more avoidance (see Table 2).

Table 2

Comparison of the Means between the Success Condition and the Failure Condition

	Success condition (N = 36)	Failure condition (N = 36)	Comparison conditions	
	M (SD)	M (SD)	F(1,69)-value	η^2
Puzzle task				
Incompetence	2.49 (.78)	3.53 (1.02)	18.19***	.21
Negative affect	1.87 (.64)	2.66 (.96)	13.53***	.16
Tension	3.74 (1.54)	4.76 (1.68)	6.02*	.08
Coping response				
Rumination	1.72 (.70)	1.99 (.87)	2.38	.03
Avoidance	1.66 (.62)	2.19 (.92)	5.43*	.07
Acceptance	4.24 (.62)	3.91 (1.01)	2.56	.04

Note. *p < .05. ***p < .001.

Primary Analyses

To investigate whether EC perfectionism moderated the relation between condition and the three coping responses, we performed three separate hierarchical regression analyses with rumination, avoidance, and acceptance being entered as separate outcomes, while controlling for previous experience with the tangram puzzle. In a first step, we entered simultaneously the standardized score of EC perfectionism and condition as predictors, while in a second step the interaction term between these two variables was added as a predictor (see Table 3). In the first step, EC perfectionism predicted positively rumination and avoidance and negatively acceptance. In the second step, the interaction between EC perfectionism and condition significantly predicted rumination and acceptance (but not avoidance).

The two significant interactions were further examined by means of simple slope analyses, in which the significance of the slopes of the regressions at two levels of the moderator are calculated, that is, at low (i.e., < 1 *SD* below the mean) and high (i.e., > 1 *SD* above the mean) levels of EC perfectionism (Hayes & Matthes, 2009). As displayed in Figs. 1 and 2, failure (compared to success) only predicted higher levels of rumination (slope = 0.71; t = 2.99; $p < 0.01$) and lower levels of acceptance (slope = -0.87; t = -3.45; $p < 0.01$) in those individuals with a high level of EC perfectionism. Individuals scoring low on EC perfectionism, experienced similar levels of rumination (slope = 0.30; t = 1.73; $p > 0.05$) and acceptance (slope = -0.32; $t = -1.74$; $p > 0.05$) across both conditions.

Table 3

Hierarchical Regression Analyses with Evaluative Concerns perfectionism, Condition and their Interaction Predicting Rumination, Avoidance, and Acceptance

	Rumination		Avoidance		Acceptance	
	Step 1 β	Step 2 β	Step 1 β	Step 2 β	Step 1 β	Step 2 β
EC perfectionism	.40**	.16	.38***	.20	-.33**	-.03
Condition	.20	.19	.27*	.27*	-.21	-.19
Interaction		.35*		.25		-.43**
R^2	.19	.26	.32	.35	.14	.24
F for R^2 change	8.06**	5.93*	10.11***	3.50	5.57**	8.84**

Note. EC = Evaluative concerns. Condition was coded as '0' for the success condition and as '1' for the failure condition. *$p < .05$. **$p < .01$. ***$p < .001$.

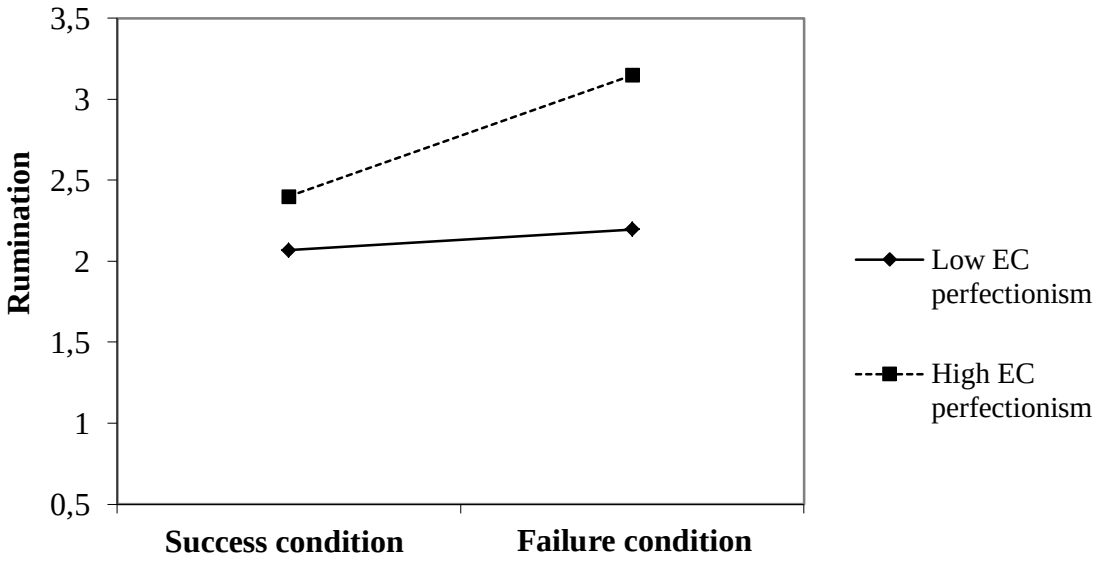

Figure 1. Two-way Interaction of Evaluative Concerns Perfectionism x Condition predicting Rumination.

EC = Evaluative concerns.

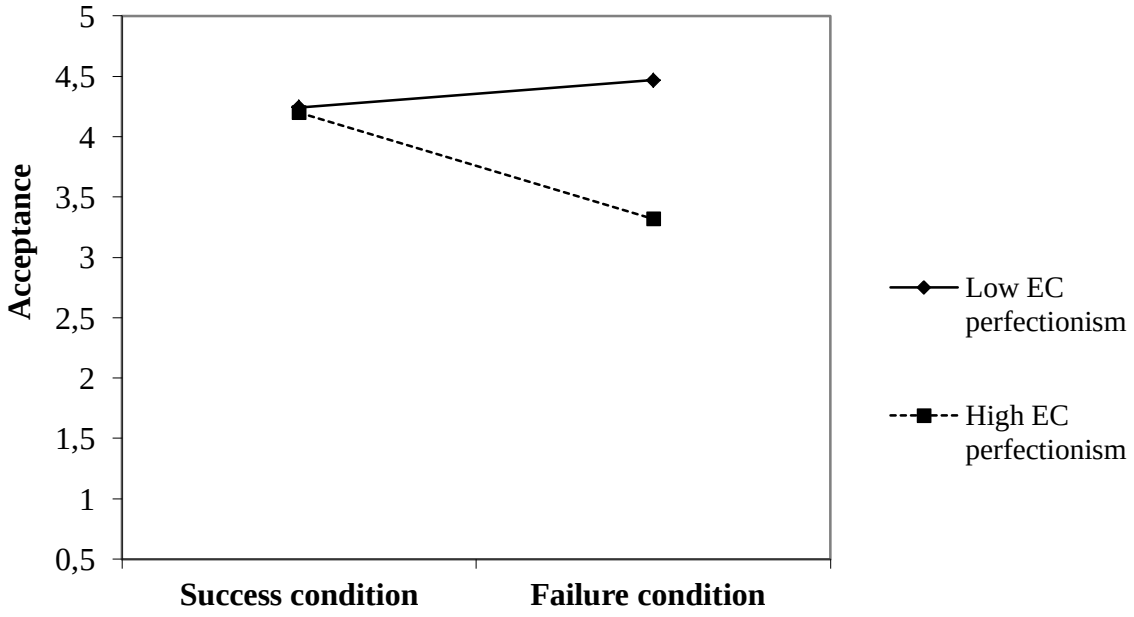

Figure 2. Two-way Interaction of Evaluative Concerns Perfectionism x Condition predicting Acceptance.

EC = Evaluative concerns.

Discussion

The aim of this study was to investigate the relation between EC perfectionism and coping responses with respect to an experimentally-induced failure experience. The exposure to an experimentally-induced and, hence, standardized event of failure was deemed critical to rule out the possibility that associations between EC perfectionism and emotion-focused coping could be accounted for by the more severe nature of stressors encountered by EC perfectionists.

Clearly, the failure manipulation worked as it produced feelings of incompetence, tension, and negative affect directly following the task participation and greater feelings of avoidance of the event one week later. Yet, especially individuals higher in EC perfectionism had trouble in coping with the failure one week later. That is, congruent with previous studies (e.g., James et al., 2015), they ruminated more when confronted with failure (relative to success) and they were less accepting of their failure. Presumably, the latter finding is indicative of EC perfectionists' conditional attitude towards themselves, that is, their tendency to let their self-worth depend heavily on successes and failures (e.g., DiBartolo et al., 2004).

Interestingly, different from previous correlational studies (e.g., Dunkley & Blankstein, 2000), we found no significant interaction between the induction of failure and perfectionism when predicting avoidance. However, there was a main effect of EC perfectionism on avoidance, indicating that EC perfectionism was related positively to avoidance across experiences of success and failure. We also note that our sample was relatively small which could have hindered finding a significant interaction effect on avoidance. Indeed, the interaction effect was close to significance ($\beta = .25$, $p = .07$) and could have been significant with a larger sample. Although this interaction-effect must be interpreted with caution because it is only marginally significant, it deserves to be examined further in future experimental research with larger samples.

Finally, it is interesting to note that the three coping responses were fairly highly correlated, presumably because they all tap into different facets of emotion-focused coping (Carver & Connor-Smith, 2010). Specifically, the rather strong relation between rumination and avoidance indicates that these two coping strategies, which at first sight seem to be opposite reactions, go hand in hand. This correlation is in line with findings among clinically depressed patients (Krieger, Altenstein, Baettig, Doerig, & Holtforth, 2013). Our findings suggest that, particularly after failure, individuals scoring high on EC perfectionism display both rumination and avoidance. Although these individuals try to avoid thinking about the stressor and the associated negative feelings, this avoidant tendency seems to, paradoxically, increase the level of thinking about the stressor. Such an avoidant tendency and the subsequent ruminative response are perhaps driven by a non-accepting attitude towards failure among individuals high in EC perfectionism. Future research is needed to determine the precise relations between these three coping responses.

The current findings point out the potential benefits individuals with a high level of EC perfectionism may experience from therapeutic approaches that emphasize self-compassion. Self-compassion contains three elements, that is, (a) being kind and unconditionally accepting towards oneself (instead of being self-critical), (b) seeing one's imperfections as a human characteristic that connects one to others (rather than dealing with these in isolation), and (c) being mindful (i.e., being aware of and attended to one's emotions without judging them) when encountering negative events or self-aspects (instead of ruminating over or avoiding these) (Neff, 2003). These elements are closely related to the coping responses investigated in the current study, with the first element relating to acceptance and with the third element relating to both rumination and avoidance. As such, the present findings provide indirect empirical support for therapeutic approaches that are based on increasing self-compassion, such as Compassionate Mind Training (Barnard & Curry, 2011).

Limitations and Directions for Future Research

This study had several limitations that warrant caution when interpreting the findings. First, we employed a relatively small sample consisting mostly of women and university students. This small and rather homogeneous sample limits the generalizability of our findings. It would be interesting for future research to examine coping experimentally using larger and more heterogeneous samples of participants differing in important sociodemographic characteristics such as age, sex, level of education, and cultural background. Second, although the induction of failure led to negative feelings (e.g., incompetence), this induction was a relatively minor stressful event. Thus, it remains to be examined whether effects of EC perfectionism on coping would be similar in response to stronger and more stressful events. We must note, however, that previous studies have indicated that often daily hassles are more stressful than major life events (e.g., DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982) and inducing major stress may not be ethically acceptable. Third, because we assessed coping fairly shortly after the event (i.e., after a week), future studies may want to assess coping after induced failure multiple times across a longer period to investigate the dynamic relation between EC perfectionism and coping. Such future research can further address the possibility that emotion-focused coping responses account at least partly for the maladjustment (e.g., depressive symptomatology) associated with EC perfectionism and perhaps even for the perpetuation of EC perfectionism itself (Shafran et al., 2002).

Conclusion

Using an experimental approach, we found that EC perfectionism was related to heightened levels of rumination and reduced acceptance of failure (relative to success). Further, EC perfectionism related to more avoidance after experiences of both failure and success. These findings corroborate and complement extant correlational research on the emotion-focused coping strategies associated with EC

perfectionism. They also underline the importance of targeting coping with stress in interventions and counseling with individuals displaying a heightened level of EC perfectionism.

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The Development and Validation of an Implicit Measure of Competence Need Satisfaction[1]

Research on Self-Determination Theory has typically relied on explicit measures when examining the concept of competence satisfaction. As a result, we know relatively little about competence satisfaction that arises under conditions of automaticity. Across five studies we develop and validate an implicit measure of competence satisfaction by drawing on two tasks: a propositional variant of the Implicit Association Test (IAT) and the Implicit Relational Assessment Procedure (IRAP). Results across the studies revealed that although both implicit measures were either unrelated or moderately related to their explicit counterpart, they were also unrelated to one another. The IAT (and to a lesser extent the IRAP) were shown to be reliable, to display discriminant validity, and to yield meaningful but modest relations with constructs in a nomological network. Together, results provide modest support for the usefulness of the competence satisfaction IAT as an implicit measure of the need for competence. Future research concerning the unique predictive value of this measure is needed.

[1] Van der Kaap-Deeder, J., De Houwer, J., Soenens, B., Hughes, S., & Vansteenkiste, M. (2016). The development and validation of an implicit measure of competence need satisfaction. *Manuscript in preparation*.

Introduction

Competence refers to the experience of effectiveness when interacting with the environment (White, 1959) and is a core element in many theoretical accounts such as self-efficacy theory (Bandura, 1977), expectancy-valence theory (Atkinson & Feather, 1966; Feather, 1992) and Self-Determination Theory (SDT; Deci & Ryan, 2000). A notable shortcoming of past work within the SDT-tradition in particular is the exclusive reliance on explicit measures (i.e., questionnaires) to tap into competence need satisfaction, precluding the benefits that are associated with the use of implicit measures (e.g., not depending on introspective access; Gawronski, 2009). Therefore, the aim of the present contribution was to develop and validate an implicit measure of competence need satisfaction through a series of five correlational and experimental studies.

Competence in Self-Determination Theory

Within SDT (Deci & Ryan, 2000), competence is considered (along with autonomy and relatedness) as an inborn basic psychological need. According to the theory, psychological needs must be satisfied before people can thrive and function optimally. This claim has gained support from between-person (e.g., Ng, Lonsdale, & Hodge, 2011) and day-to-day level studies (e.g., Ryan, Bernstein, & Brown, 2010) showing that competence need satisfaction yields multiple benefits, including higher well-being, persistence, and performance. Such findings emerged in various life domains, including work (e.g., Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010), school (e.g., Deci, Hodges, Pierson, & Tomassone, 1992) and sports (e.g., Wang, Liu, Lochbaum, & Stevenson, 2009). In contrast, feelings of inadequacy are associated with negative outcomes such as depressive symptoms (e.g., Dwyer, Hornsey, Smith, Oei, & Dingle, 2011).

Although many researchers have focused on the *satisfaction* of one's need for competence, others have started to examine the *desire* for competence satisfaction (i.e., how strongly people desire to feel competent). This latter work has focused on two questions in particular. First, does one's desire to feel competent moderate the association between competence satisfaction and well-being? Recent

evidence using self-report measures of desire for competence generally suggests this may not be the case. For instance, Chen et al. (2015) examined the well-being of individuals across four countries (i.e., Belgium, China, Peru, and USA) and found that individuals' well-being increased in-line with their experience of need satisfaction (including competence need satisfaction). Critically, however, the relation between need satisfaction and well-being was not moderated by the *desire* for need satisfaction, suggesting that need satisfaction is beneficial for everyone, even for those who do not desire that these needs be met (an idea consistent with SDT). Second, researchers have also examined whether a desire for competence is rooted in frustration of one's need for competence. For instance, Sheldon and Gunz (2009) found that frustration of one's psychological needs (including the need for competence) predicts a stronger desire to have these needs met. Thus it appears that need frustration motivates people to desire need satisfaction more strongly and to overcome the need-frustrating experiences.

Competence and Implicit Measures

SDT-based research on competence has almost exclusively relied on *direct measurement procedures* like questionnaires which provide an explicit measure of one's satisfaction of the need of competence. Such direct procedures are useful only so long as people have both introspective access to, as well as the opportunity and motivation to accurately report on, their psychological attributes or content. Yet, this is often not the case in socially-sensitive areas or situations in which the individual lacks introspective accessibility to the content under investigation. Because individuals might not always be willing to report on their competence feelings or lack the capability to do so, an implicit measure of competence satisfaction might be valuable in these cases.

Over the past two decades *indirect measurement procedures* have sought to circumvent these problems and crack open the hidden world of 'implicit' cognition. These procedures seek to circumvent a person's ability to strategically control their behavior as well as capture psychological processes, attributes, or content in ways that do not depend on introspective access. Their value also lies in the fact

that they aim to capture thoughts, feelings, and actions that elude explicit measures (e.g., Gawronski, 2009).

It is worth noting that implicit measures have already been used to examine concepts related to competence. One such example is the need for achievement or the desire to be successful in achievement-related tasks (Schultheiss & Brunstein, 2005; see also McClelland, Atkinson, Clark, & Lowell, 1953; Thrash & Elliot, 2002). Unlike the competence construct in SDT, the need for achievement represents an acquired interpersonal difference variable reflecting people's dispositional tendency of wanting to excel in achievement settings. This phenomenon has mainly been assessed at the implicit level (e.g., Atkinson, 1958; Thrash & Elliot, 2002) through the use of the Thematic Apperception Test (TAT; Murray, 1943). A typical TAT consists out of four to six pictures and asks individuals to invent a story for each picture by answering some questions (e.g., "Who are the persons on the picture?"). These written stories are then coded in terms of achievement-related content. Although the TAT has often been criticized for its poor psychometric properties (e.g., low internal consistency; Lilienfeld, Wood, & Garb, 2000), the debate has not yet been resolved (Hibbard, 2003).

To overcome some of the limitations associated with the TAT, researchers have increasingly turned to reaction time based procedures such as the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). Although the IAT has mainly been used in the context of attitude research (e.g., prejudice), the IAT also proved useful to assess implicit motives, such as the motive to achieve (e.g., Brunstein & Schmitt, 2004; Slabbinck, De Houwer, & Van Kenhove, 2011). Specifically, Brunstein and Schmitt (2004) used an adapted IAT, where individuals were presented with words related to the self (e.g., 'I') and others (e.g., 'they') and other words related to success (e.g., 'ambitious') or no success (e.g., 'idle'). During one part of the task participants were asked to categorize self and successful words using one response key and others along with non-successful words using a second key. During a second part of the task these response mappings were reversed, such that self and non-successful words were now categorized using one key and others and successful

words were categorized using the second key. A higher score on the IAT reflected quicker responding during the first relative to the second part of the task. In their study, Brunstein and Schmitt (2004) found that IAT scores were a better predictor of performance during a mental concentration task than self-reported achievement motivation, while the latter predicted greater task enjoyment than the former. Thus implicit measures can contribute in unique ways to research on needs and motives.

Towards a Relational Perspective on Implicitly Assessed Competence Satisfaction

Although the aforementioned work is certainly promising, it suffers from one (potentially) important limitation. Nearly every indirect procedures to date (including the IAT) only indicates the extent to which one set of concepts (e.g., 'self' and 'others') are *associated* to a second set of concepts (e.g., 'successful' or 'unsuccessful'). In this way they say little about the way in which those stimuli are *related* to one another. To illustrate this point more clearly, consider implicit self-esteem. A number of studies have found that people who were formerly depressed unexpectedly display higher implicit self-esteem than those who were never depressed (e.g., Gemar, Segal, Sagrati, & Kennedy, 2001). In an attempt to clarify this surprising finding, Remue, De Houwer, Barnes-Holmes, Vanderhasselt, and De Raedt (2013) made use of a task called the Implicit Relational Assessment Procedure (IRAP; Vahey, Barnes-Holmes, Barnes-Holmes, & Stewart, 2009) which can indicate how stimuli are related rather than simply associated. Specifically, they created two different IRAPs, one designed to assess actual self-evaluations (e.g., 'I am' vs. 'I am not' good or bad) and another designed to assess ideal self-evaluations ('I want to be' vs. 'I don't want to be' good or bad). They found that participants who reported higher levels of depressive symptoms produced higher ideal self-evaluations and lower actual self-evaluations compared to their non-depressed counterparts.

A similar situation may also apply in the domain of implicit motivation and needs. Take the Brunstein and Schmitt (2004) study mentioned above. It may be that the IAT scores of some individuals reflected a belief that "*I am successful*" (which would reflect competence satisfaction) whereas, for other participants, scores reflected a belief that "*I want to be successful*" (which would

reflect competence desire). The key message here is that categorizing one set of stimuli more quickly than another set of stimuli tells us little about the different ways that people may be *relating* those stimuli under the conditions of automaticity. Just as the movement from interpretative (TAT) to reaction time based tasks (IAT) spurred developments in research on the assessment of implicit needs, so too might the move from mere stimulus categorization tasks such as the standard IAT to relational tasks provide greater diagnostic and predictive information about phenomenon such as competence satisfaction.

Examining the Nomological Network

As an important step in the validation process of our proposed implicit measures of competence satisfaction, we aimed to examine the nomological network surrounding the construct of competence satisfaction. Indeed, as proposed by Cronbach and Meehl (1955), an important way to establish the construct validity of a newly-developed measure is to investigate the network of related constructs. On the basis of previous studies relevant to competence, we selected a number of constructs to be part of this nomological network, namely perfectionism, self-esteem, and contingent self-esteem.

With regard to perfectionism, an important distinction is made between "evaluative concerns perfectionism" and "personal standards perfectionism" (Frost, Marten, Lahart, & Rosenblate, 1990). Personal standards perfectionism is characterized by the setting of high personal standards (i.e., wanting to be highly competent), whereas evaluative concerns perfectionism is typified by high levels of evaluative concerns and self-criticism (i.e., doubting of competence) (e.g., Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000). Past work has shown that evaluative concerns perfectionism is particularly strongly related to maladjustment (e.g., distress; Dunkley et al., 2000). More directly relevant to the present study, Boone, Vansteenkiste, Soenens, Van der Kaap-Deeder, and Verstuyf (2014) showed that evaluative concerns perfectionism was related positively to competence frustration in adolescents.

Self-esteem was also assessed because several studies have established a positive relationship between self-esteem and competence satisfaction. For example, Heppner, Kernis, Nezlek, Foster, Lakey, and Goldman (2008) showed that daily variation in competence satisfaction related to daily variation in self-worth. Whereas competence satisfaction may relate positively to overall self-worth, it is likely to relate negatively to contingent self-esteem. Contingent self-esteem is characteristic of individuals who tend to hinge their self-esteem on meeting internal or external goals/expectations (Deci & Ryan, 1995). The fragility of their self-worth is thought to be rooted in insecurity about personal competence and to give rise to competence-frustrating experiences. Indeed, several studies have shown that an active pursuit of self-esteem relates to competency-undermining behaviors (e.g., by focusing too much on the avoidance of failure and therefore missing out on possible learning experiences) (Crocker, 2002). As such, we anticipated a negative association between implicit competence satisfaction and contingent self-esteem.

The Present Research

Given the central importance of competence satisfaction for individuals' adjustment and well-being, the benefits and unique predictive value of implicit measures, and the value of relational implicit measures, we sought to validate two new implicit (relational) measures of competence satisfaction (i.e., a relational variant of the IAT and an IRAP). Across five studies we set out to validate these implicit competence satisfaction measures by (1) examining the relation between implicit and explicit measures of competence satisfaction; (2) investigating the relation between our implicit measures and their nomological network (see before), and (3) determining the unique predictive value of these implicit measures when controlling for explicit competence satisfaction.

We forward the following hypotheses. First, although implicit and explicit measures highlight different aspects of the same phenomenon, we expected to find a small to moderate positive correlation between explicit and implicit measures of competence satisfaction (Hoffmann, Gawronski,

Gschwender, Le, & Schmitt, 2005) (*Hypothesis 1*). Second, as for the nomological network surrounding competence, we expected that the (implicit and explicit) measures of competence satisfaction would correlate positively with self-esteem (both explicitly and implicitly assessed) and personal standards perfectionism, while negatively correlating with contingent self-esteem and evaluative concerns perfectionism (*Hypothesis 2*). Finally, as previous research has shown that implicit measures are especially valuable when predicting behavior occurring under reduced cognitive capacity (Gawronski, 2009), we expected that the implicit measures of competence satisfaction would have unique value when predicting implicit self-esteem and other outcomes not obtained via questionnaires *(Hypothesis 3)*. Besides these general aims that were investigated across the five studies, we also formulated more specific hypotheses per study (which are explained in the study-specific sections below).

Whereas Study 1, 4, and 5 focused solely on a competence satisfaction IAT, we focused on a competence satisfaction IRAP in Study 2. To directly compare both implicit measures, we included both the competence satisfaction IAT and the competence satisfaction IRAP in Study 3. To determine the discriminant validity of both implicit measures of competence satisfaction, we also included an implicit measure of competence desire in Study 1 and 2. Further, whereas Study 1, 2, and 5 employed a cross-sectional design (to examine the relation between the implicit measure and constructs within the nomological network), we experimentally induced feelings of either competence satisfaction or frustration in Study 3 and 4 to determine whether the implicit measures would be sensitive to changes in individuals' state competence satisfaction. Additionally, whereas the first four studies included student samples, we included a clinical sample in Study 5 (i.e., eating disorder patients) to determine the generalizability of the implicit measure of competence satisfaction.

Note that, although we implicitly assessed competence desire in Study 1 and 2 to determine the discriminant validity of the implicit measure of competence satisfaction, we will focus on the results of the competence satisfaction IAT or IRAP (rather than the implicit measure of competence desire). We

chose to do so because our main aim was to develop and validate an implicit measure of competence satisfaction as SDT postulates that the satisfaction of this need is more important for individuals' well-being than the desire for this need (Deci & Ryan, 2000).

Study 1

In Study 1 we set out to examine the correlation between the implicit and explicit measure of competence satisfaction (i.e., *Hypothesis 1*), the relations between the implicit measure and constructs within the nomological network (i.e., *Hypothesis 2*), and the unique predictive value of the implicit measure (i.e., *Hypothesis 3*) with a sample of students who differed in their evaluative concerns and personal standards perfectionism. We chose to select individuals on the basis of their perfectionism score, as recommended in the known-group approach (e.g., Greenwald & Farnham, 2000). The first group (personal standards condition) was comprised of those who reported high personal standards but low evaluative concerns perfectionism while the second group (evaluative concerns condition) reported high personal standards *and* evaluative concerns perfectionism. These groups were created based on the assumption that they would display different levels of competence satisfaction and desire. Specifically, we anticipated that the evaluative concerns group would score lower on satisfaction of the need for competence and higher on desire for competence compared to the personal standards group. We also expected the competence satisfaction IAT to relate only modestly (and negatively) to a competence desire IAT. Such a finding would attest to the discriminant validity of the IAT as it suggest that people can respond differently to different types of self-related statements ('I am' vs. 'I desire') and that their automatic responses concerning competence satisfaction cannot be equated with their automatic responses concerning competence desire. Finally, given that previous research suggests that perceived competence is related to actual competence (e.g., Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2002), we expected a positive relation between the competence satisfaction IAT and exam grades.

Method

Participants

Three hundred and ninety seven students (315 women) between 16 and 41 years old (M = 19.16; SD = 2.83) at a Belgian university completed an initial on-line measure. Most of them were bachelor students in psychology (N = 313). Participants were screened based on their scores on the Frost Multidimensional Perfectionism Scale (F-MPS; Frost et al., 1990) to assess evaluative concerns and personal standards perfectionism. Consistent with past research in this literature (e.g., Boone, Soenens, Braet, & Goossens, 2010; Rice, Ashby, & Gilman, 2011), scores on this measure were then submitted to a two-step cluster analysis in order to create two contrasting groups (i.e., Ward method + optimization through non-hierarchical *k*-means clustering as recommended by Gore, 2000). This led to a four-cluster solution: (1) individuals scoring low on evaluative concerns, but high on personal standards (i.e., the personal standards condition); (2) individuals with elevated scores on both variables (i.e., the evaluative concerns condition); (3) a group scoring low on both variables; and finally (4) a group who scored high on evaluative concerns and low on personal standards. Individuals belonging to the first two clusters were invited to participate in this study in exchange for course credits. Most participants were first year bachelor students in psychology (N = 56). Sixty two (53 women) individuals aged between 18 and 36 years (M = 18.92; SD = 2.49) took part, with thirty two assigned to the personal standards and thirty to the evaluative concerns condition.

Procedure

Upon arrival to the laboratory all participants were asked to provide informed consent and were tested individually. They were then provided with a cover story stating that the aim of the study was to investigate visual information processing. Thereafter they completed the competence satisfaction and desire IATs. The order of these IATs was counterbalanced within each group. After completing the IATs, participants filled out a battery of questionnaires (see further). Once all measures were completed participants were thanked, debriefed, and dismissed.

Implicit Measures

Competence Satisfaction IAT. Participants first read a set of instructions on the computer screen. The instructions stated that the goal was to categorize each depicted word into one of four possible categories, namely *competent*, *incompetent*, *I am*, and *I am not*. They could indicate their answer by pressing either the left response key (Q) or the right response key (M) (on an AZERTY key board) meaning respectively that the word belongs to the category portrayed in the left upper corner or to the category in the right upper corner. Furthermore, participants were instructed to respond as quickly as possible but at the same time not to make too many mistakes. We consider this task to be a relational variant of the IAT because, unlike to what is the case for the standard IAT task, the target categories specify a particular type of relation (i.e., whether a trait applies to the self; see De Houwer, Heider, Spruyt, Roets, & Hughes, 2015, for a detailed discussion).

We developed stimuli related to competence and incompetence on the basis of the items of the competence subscale of the Basic Psychological Need Satisfaction and Need Frustration scale (BPNSNF; Chen et al., 2015), a comprehensive measure of need satisfaction and need frustration that has been validated in various countries. Stimuli for *competent* were: 'skilled', 'successful', 'capable', and 'able'. Stimuli for *incompetent* were: 'failure', 'inadequate', 'to fail', and 'unable'. The stimuli belonging to the categories *I am* and *I am not* were based on characteristics of the participant and were entered at the beginning of the IAT by the experimenter. The following stimuli were used: 'human' vs. 'animal', 'woman' vs. 'man', 'student' vs. 'employee', and 'Belgian' vs. 'German'.

As recommended by Greenwald et al. (1998), the IAT consisted of five blocks. In the first block (24 trials), participants were required to discern between *incompetence*- and *competence*-related words by pressing the left key or the right key, respectively. Then, in Block 2 (24 trials), participants categorized words either in the *I am* category (left key) or in the *I am not* category (right key). In the first combined block (Block 3; 96 trials) the categories *incompetent* and *I am* were displayed below each other in the left upper corner of the screen, whereas in the right upper corner the categories

competent and *I am not* were put together. Participants had to categorize words belonging to the *incompetent* (e.g., 'failure') or *I am* (e.g., 'human') categories by pressing the left button and to categorize words belonging to the *competent* (e.g., 'skilled') or *I am not* (e.g., 'animal') categories by pressing the right button. This was the incongruent block which assessed the association between the self and incompetence. Subsequently, in Block 4 (24 trials) only the competence-related categories were displayed, but their position was switched so that participants were required to press the left button when encountering a *competence*-related word and the right button when seeing an *incompetence*-related word. The last block (Block 5; 96 trials) was a second combined block but now with *competent* and *I am* portrayed in the left corner and *incompetent* and *I am not* in the right corner. Participants had to categorize words belonging to the *competent* or *I am* categories by pressing the left button and to categorize words belonging to the *incompetent* or *I am not* categories by pressing the right button. This was the congruent block which assessed the association between the self and competence.

The stimuli that needed to be categorized were displayed in the center of a black computer screen in white uppercase letters (Arial font). The categories were presented in the upper corners of the screen using black bold uppercase letters (Courier font) in two (one left; one right) white filled squares. The interstimulus interval was 400 ms and within each block, stimuli were shown randomly. When a participant made an error, a red 'X' appeared for 400 ms. The IAT was programmed using the INQUISIT Milliseconds software package (INQUISIT 3.0.6.0, 2011).

Competence Desire IAT. The IAT for the assessment of the desire for competence was similar to the competence satisfaction IAT as discussed above, with the exception that the category *I am* was replaced with *I desire*, and the category *I am not* replaced with *I do not desire*. Stimuli for the category *I desire* were 'I approach', 'I want', 'I strive', and 'I long' and for the category *I do not desire* these were 'I remove', 'I avoid', 'I avert', and 'I obstruct'.

Self-report Measures

All items were answered on a Likert scale ranging from 1 (*completely not true*) to 5 (*completely true*), unless specified otherwise.

Perfectionism. Prior to the study, a Dutch translation (Soenens, Vansteenkiste, Luyten, Duriez, & Goossens, 2005) of the three subscales of the F-MPS was used to screen individuals for participation. Participants completed the F-MPS once again following the IATs so that we could obtain scores related to perfectionism at the time of testing. The first component of perfectionism (Personal Standards) relates to the setting of high standards and consisted out of 6 items (e.g., "If I do not set the highest standards for myself, I am likely to end up a second-rate person"). This subscale showed adequate reliability (α = .73). The second component of perfectionism (Evaluative concerns) was assessed by averaging scores from the Concerns over Mistakes (9 items, e.g., "People will think less of me if I make a mistake") and Doubts about Actions subscales (4 items, e.g., "It takes me a long time to do something right"). This measure showed adequate reliability (α = .86).

Competence Satisfaction. Self-reported feelings of competence were assessed using the competence subscale of the Basic Psychological Need Satisfaction and Need Frustration scale (BPNSNF; Chen et al., 2015). This subscale consisted out of 8 items reflecting whether the need for competence was satisfied (e.g., "I feel confident that I can do things well") or frustrated (e.g., "I have serious doubts about whether I can do things well"). Frustration related items were reversed scored to obtain a relative score of competence satisfaction. This measure showed adequate reliability (α = .89).

Competence Desire. The desire to feel competent was assessed by means of the competence-related subscale (3 items) of the Needs-as-Motives scale (Sheldon & Gunz, 2009). People were asked to indicate how much they would like to make three competence-related changes in their life if they would have the chance to do so (e.g., "You manage to become better at some activity that is important to you, and feel less inept and incompetent"). Participants responded using a Likert scale ranging from 1 (*no desire for this change*) to 5 (*much desire for this change*). Cronbach's alpha was .69.

Explicit Self-Esteem. The Dutch version (Franck, De Raedt, Barbez, & Rosseel, 2008) of the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1979) was used to assess global self-esteem. This scale consists of 10 items (e.g., "On the whole, I am satisfied with myself") that were rated on a scale ranging from 0 (*strongly disagree*) to 3 (*strongly agree*). Cronbach's alpha was .88.

Implicit Self-Esteem. Self-esteem was assessed implicitly by means of the Initial Preference Task (Nuttin, 1985; Greenwald & Banaji, 1995). This task is based on the assumption that the degree to which people like their own initials relative to the other letters of the alphabet reflects unconscious preferences for the self. Participants were asked to indicate how much they liked each letter of the alphabet from A to Z on a scale from 1 (*I totally dislike this letter*) to 9 (*I like this letter very much*). The ipsatized double-correction algorithm (*I*-algorithm), as recommended by LeBel and Gawronski (2009), was used to calculate the name-letter effect. This algorithm controls for two possible confounds, namely (a) the extent to which participants in general like non-initial letters (i.e., the individual response tendency) and (b) the extent to which other participants with other initials like the specific initials (i.e., the general normative letter liking). The reliability was calculated by determining the correlation between the I-score obtained for the initial of the first and the initial of the last name. The observed reliability was low yet comparable with other studies using this measure (α = .36; LeBel & Gawronski, 2009).

Contingent Self-Esteem. Participants completed the Dutch version (Soenens & Duriez, 2012) of the Contingent Self-esteem Scale (CSS; Paradise & Kernis, 1999). It consists of 15 items (e.g., "I consider performing well as important for my self-esteem") and was reliable (α = .79).

Academic Grades. At the end of the first year of their bachelor program in psychology, participants were contacted to ask their consent for access to their official academic grades. Everyone approved. We had only access to academic grades obtained by students following a bachelor in psychology, thereby excluding 6 other participants. In addition, grades from 1 student were missing.

We employed the mean level of the grades (of in total 12 courses) for our study. Grades could range between 0 and 20 with a 10 or higher being sufficient to pass the course.

Results

Descriptive Statistics and Preliminary Analyses

Participant Exclusion. We inspected participants' responses on the IATs. Specifically, we checked whether there were participants who had a reaction time of 300 ms or less on at least 10% of the trials. This was not the case, such that all participants were retained in the analyses.

Table 1

Comparison of the Means between the Personal Standards and Evaluative Concerns Perfectionistic Groups (Study 1)

	Personal standards perfectionistic group (N = 32)	Evaluative concerns perfectionistic group (N = 30)	Comparison groups	
	M (SD)	M (SD)	F-value	η^2
Perfectionism dimensions				
Personal standards	3.25 (.51)	3.58 (.55)	$F(1, 60) = 5.86$*	.09
Evaluative concerns	2.29 (.50)	3.04 (.51)	$F(1, 60) = 34.00$***	.36
Implicit measures (IATs)				
Competence satisfaction	.88 (.25)	.83 (.27)	$F(1, 60) = .50$	.01
Competence desire	.88 (.21)	1.00 (.22)	$F(1, 60) = 5.16$*	.08
Explicit measures				
Competence satisfaction	3.75 (.57)	3.03 (.69)	$F(1, 59) = 18.84$***	.24
Competence desire	3.27 (.81)	3.85 (.80)	$F(1, 59) = -7.94$**	.12

Note. IAT = Implicit Association Test. *$p < .05$. **$p < .01$. ***$p < .001$.

Manipulation Check. First, we checked the validity of participants' assignment to the perfectionism profiles by examining whether perfectionism group membership was related to participants' perfectionism scores obtained at the time of the experiment. As shown in Table 1, the results of a MANOVA showed that, as expected, individuals in the evaluative concerns perfectionistic group reported more evaluative concerns perfectionism at the time of the experiment compared to individuals in the personal standards perfectionistic group. Although less pronounced, individuals in the evaluative concerns group also reported higher levels of personal standards perfectionism than individuals in the personal standards group.

IATs. Next, the IAT effect was determined by calculating the *D*6 measure (Greenwald, Banaji, & Nosek, 2003). Latencies on error trials were replaced by the mean of the correct responses plus a penalty of 600 ms and the IAT effect was determined by subtracting the latencies of Block 5 (self + competent) from the latencies of Block 3 (self + incompetent). Therefore, the higher the IAT score, the stronger the belief "I am competent" (competence satisfaction IAT) or "I desire to be competent" (competence desire IAT). To determine the reliability of the IATs, each dataset was split into even and odd numbered trials and then the *D*6 measure was calculated for these two separate data-files. These two *D*6-measures were correlated and corrected with the Spearman-Brown formula. The split-half reliabilities were adequate with .73 for the competence satisfaction IAT and .69 for the competence desire IAT.

Background Variables. We performed a MANCOVA with gender and education (secondary vs. higher education) as fixed factors and age as a covariate in the prediction of all study variables. Age [$F(8, 41) = 0.82$, $p > .05$ ($\eta^2 = .14$)], gender [$F(8, 41) = 1.68$, $p > .05$ ($\eta^2 = .25$)], as well as education [$F(8, 41) = 0.68$, $p > .05$ ($\eta^2 = .12$)] were unrelated to the study variables, and as such were excluded from subsequent analyses.

Primary Analyses

Group Differences. As a first test of the validity of both IATs, we performed a repeated measures ANOVA to investigate whether the difference between both IATs would differ as a function of group membership (i.e., the evaluative concerns and personal standards perfectionistic group). Results showed that there was no significant difference between the scores on the two IATs in general [$F(1, 60) = 3.74$, $p = .06$ ($\eta^2 = .06$)]. However, there was a significant interaction effect between the type of IAT (satisfaction vs. desire) and group membership [$F(1, 60) = 4.35$, $p = .04$ ($\eta^2 = .07$)]. Follow-up one way ANOVAs revealed that the two perfectionism groups differed in their desire IAT scores but not in their satisfaction IAT scores. On the one hand, participants showed a (strong) relative bias for responding to one's self as competent compared to incompetent and for desiring competence rather than incompetence, regardless of whether they were in the evaluative outcomes or personal standards conditions. However, the participants in the evaluative concerns group showed a higher desire for competence than participants in the personal standards group (see Table 1).

To examine whether the pattern of differences between the perfectionism groups in terms of implicit need for competence measures would be similar to the pattern of findings with the corresponding explicit measures, we performed another set of ANOVAs to investigate group differences in explicit competence satisfaction and desire. As can be noticed in Table 1, the ANOVAs indicated that the two perfectionistic groups differed with respect to both explicit competence satisfaction and explicit competence desire. Specifically, participants in the evaluative concerns group experienced less competence satisfaction but expressed a greater desire for competence. This pattern of findings is similar to the pattern of findings with the implicit measure, with the exception that implicit competence satisfaction did not differ significantly between the two groups.

Correlational Analyses. In a following step, we performed a series of bivariate correlations as to gain further insight into the validity of the competence satisfaction IAT in particular. Table 2[2] displays correlations between the competence satisfaction IAT, the competence desire IAT, the corresponding explicit measures, the variables from the nomological network, and the obtained academic grades. A number of findings can be highlighted. First, we investigated the relation between the two IATs. Correlations showed that the competence satisfaction IAT and the competence desire IAT were unrelated. Second, the competence satisfaction IAT related positively to its explicit counterpart. Third, we inspected the relation between the competence satisfaction IAT and constructs in its nomological network. Higher scores on the competence satisfaction IAT were associated with higher levels of explicit self-esteem and marginally to higher levels of implicit self-esteem. Further, scores on the competence satisfaction IAT related negatively to contingent self-esteem. As can be seen Table 2, the associations between the competence satisfaction IAT and these constructs in the nomological network were similar to the associations obtained between the explicit measure of competence satisfaction and these same constructs. However, when we controlled for explicit competence satisfaction, the competence satisfaction IAT only related to implicit self-esteem and contingent self-esteem. Finally, results revealed that the competence satisfaction IAT did not relate to participants' mean level of academic grades.

[2] To see whether the order of the IATs would make a difference with respect to the correlations between these IATs and other constructs as reported in Table 2, we reran these analyses with data either from participants who completed the competence satisfaction IAT first or from participants who completed the competence desire IAT first. There were no relevant differences between these correlations and the correlations reported in Table 2.

Table 2

Descriptives and Correlations between Study Variables (Study 1)

	M	*SD*	1a	1b	2	3	4
1. Competence satisfaction IAT	0.86	0.26	_				
2. Competence desire IAT	0.94	0.22	.05	_	_		
3. Competence satisfaction (C)	3.40	0.72	.31*	_	-.07	_	
4. Competence desire	3.55	0.85	-.19	_	-.08	-.64***	_
5. Explicit self-esteem	1.84	0.49	.34**	.17	-.19	.68***	-.52***
6. Implicit self-esteem	1.70	1.33	.25†	.28*	-.05	.22†	-.06
7. Contingent self-esteem	3.75	0.39	-.35**	-.24†	.04	-.50***	.46***
8. *M*grades	11.71	3.23	.00	-.15	-.06	.32*	-.15

Note. Whereas 1a refers to the analyses without controlling for explicit competence satisfaction, 1b refers to the partial correlations controlling for explicit competence satisfaction.

IAT = Implicit Association Test. C = Composite score with satisfaction items and reversed frustration-related items.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

Results of Study 1 provide initial evidence for the validity of the competence satisfaction IAT as this implicit measure related moderately to its explicit counterpart, to constructs from the nomological network (i.e., self-esteem and contingent self-esteem), and was unrelated to the competence desire IAT. This latter finding indicates that participants adequately processed the propositions of both IATs and attests to the discriminant validity of the competence satisfaction IAT. In contrast, this IAT did not relate to exam grades or differ between the two subsamples (whereas the explicit measure of competence satisfaction did). Finally, there was less evidence for the unique predictive value of the competence satisfaction IAT once explicit competence satisfaction was controlled for.

Study 2

Study 2 was similar to Study 1, with two main differences. First, we now employed two IRAPs (rather than IATs) to assess competence satisfaction and competence desire implicitly. As we mentioned in the introduction, the IRAP was specifically developed to assess how stimuli are related rather than simply categorized under the conditions of automaticity (Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010) and could therefore be more apt for capturing differences between competence satisfaction and desire (see De Houwer et al., 2015, for a more detailed discussion of the merits and limitations of relational versions of the IAT). Also, a replication of the results of Study 1 would indicate that the relations of implicitly assessed competence satisfaction do not depend on the type of implicit measure used, thereby increasing the generalizability of the findings. Additionally, we now tested a general group of university students rather than selecting groups on the basis of their perfectionism scores (i.e., known-groups approach) because we did not find significant differences in implicitly assessed competence satisfaction between the different perfectionism groups in Study 1.

Similar to Study 1, we examined the correlation between the implicit and explicit measure of competence satisfaction (i.e., *Hypothesis 1*), the relations between the implicit measure and constructs within the nomological network (i.e., *Hypothesis 2*), and the unique predictive value of the implicit measure (i.e., *Hypothesis 3*). Also, we expected the competence satisfaction IRAP to relate only modestly (and negatively) to a competence desire IRAP, attesting to the discriminant validity of the competence satisfaction IRAP.

Method

Participants

Sixty seven participants (53 female) aged between 17 and 47 years old (M = 22.13; SD = 4.26) participated in return for 10 euro. Regarding educational level, 40 had completed secondary education and 27 had completed higher education. Further, participation was voluntary and all data were processed confidentially.

Procedure

After participants gave their written consent, a bogus study aim was described to them to avoid disclosing the goal of the study. They were told that the aim of this study was to investigate their visual information processing. Subsequently, individuals completed the competence satisfaction IRAP and the competence desire IRAP. The order of these IRAPs was counterbalanced. After completing the IRAPs, participants filled out a battery of questionnaires (see further). Finally, participants were thanked, debriefed, and dismissed.

Measures

Measures identical to Study 1 were used to assess explicit competence satisfaction (α = .87), explicit competence desire (α = .55), perfectionism (α personal standards = .87 and α evaluative concerns = .87), explicit (α = .84) and implicit (α = -.03; based on the correlation between the scores

obtained for each initial) self-esteem, and contingent self-esteem (α = .90). Besides these measures, we also employed a competence satisfaction and competence desire IRAP (see below).

Competence Satisfaction IRAP. Instructions were provided both orally as well as on the computer screen. These stated that the goal of the task was to respond as quickly and accurately as possible in accordance with a particular rule, even though participants themselves might not personally agree with the rule. Specifically, the following two rules were stated: (1) "Please respond AS IF I AM competent and I AM NOT incompetent" (i.e., high competence rule) and (2) "Please respond AS IF I AM incompetent and I AM NOT competent" (i.e., low competence rule). For each trial, participants had to indicate whether the presented stimuli were true or false according to the rule by pressing the left response key (D) or the right response key (K) (on an AZERTY key board). The meaning (indicating true or false) of these response keys changed throughout the trials and appeared in the bottom left- and right-hand corners of the computer screen.

The IRAP consisted of a minimum of four practice blocks followed by six test blocks. Each block consisted of 24 trials that presented one of two self-related label stimuli (e.g., *I am* or *I am not*) in the presence of one of the competence- or incompetence-related target stimuli. The label stimulus, target stimulus, and both response options appeared on the screen simultaneously at the onset of each trial. Competence-related target stimuli were 'skilled', 'successful', 'capable', 'able', 'competent', and 'proficient' and incompetence-related target stimuli were 'failed', 'inadequate', 'flunked', 'unable', 'incompetent', and 'stupid'. Note that the first four items of each type of target were similar to those stimuli used in the IAT. The combination of the two self-related label stimuli and the two (in)competence-related target stimuli created four trial types, namely self – competence (e.g., *I am + skilled*), not-self – incompetence (e.g., *I am not + failed*), self – incompetence (e.g., *I am + failed*), and not-self – competent (e.g., *I am not + skilled*). Each of the four trial types appeared six times within each block in a random order. With respect to the blocks where participants had to respond according to the high competence rule, the correct response to the first two trial types was 'True', whereas the

correct response was ‘False’ for the latter two trials types. For the blocks where participants had to respond according to the low competence rule, the correct responses were reversed. Participants were exposed to an alternating sequence of high competence and low competence blocks of which the first block was a high competence block. Incorrect responses resulted in the presentation of a red ‘X’, which disappeared once the correct response was selected. The IRAP effect is determined by the difference in time taken to respond to the high competence relative to the low competence blocks and thus provides an index of the strength or probability of the relation between the self and competence.

During the first two practice blocks, the experimenter sat beside the participant to give feedback and answer questions when needed. After each practice block, feedback was displayed on the computer screen indicating participants’ accuracy level and median reaction time concerning that specific block. However, to ensure that individuals first focused on their accuracy (to correctly learn the task), only feedback regarding participants’ accuracy level was presented after the first practice block. After completion of the first practice block, participants were informed that they needed to obtain an accuracy level of at least 80%. Then, after the second practice block they were informed that they not only needed to obtain an accuracy level of at least 80% but also a reaction time of 2000 ms or less before they could proceed to the test blocks. If participants did not fulfill these criteria after the four practice blocks, another set of four practice blocks was introduced. Participants who subsequently still failed to reach these criteria were thanked and debriefed, and their data were discarded.

Competence Desire IRAP. A similar IRAP was used to assess the desire for competence with the exception of the label stimuli involved: *I am* and *I am not* were replaced with *I desire* and *I do not desire.* During one set of blocks participants had to respond as if “I desire to be competent” and “I do not desire to be incompetent”. During a second set of blocks they had to respond as if “I desire to be incompetent” and “I do not desire to be competent”.

Results

Descriptive Statistics and Preliminary Analyses

Participant Exclusion. Four participants failed to fulfill the criteria after two sets of practice blocks with respect to both the competence satisfaction as well as the competence desire IRAP and their data were, therefore, discarded. Subsequently, we inspected participants' IRAP responses to the test blocks. We observed that 8 individuals on the competence satisfaction IRAP and 9 individuals on the competence desire IRAP (with 6 persons being unable to fulfill criteria on both IRAPs) did not fulfill the criteria of having a reaction time of 2000 ms or less and having an accuracy level of at least 75% on all test blocks. Therefore, we excluded the IRAP data of these individuals.[3]

IRAP. Subsequently, we calculated the *D*-IRAP scores by transforming the response latencies using an adaptation of Greenwald et al.'s (2003) *D* algorithm (for details of this data transformation see Barnes-Holmes et al., 2010). For each IRAP, we calculated a single overall *D*-IRAP score where a higher score reflected a higher level of either competence satisfaction or competence desire.[4] To determine the reliability of the IRAPs, each dataset was split into even and odd numbered trials and then the *D*-IRAP score was calculated for these two separate data-files. These two *D*-IRAP scores were correlated and corrected with the Spearman-Brown formula. The split-half reliabilities were low (i.e., .08) for both the competence satisfaction and the competence desire IRAP.

Background Variables. We performed a MANCOVA with gender and education (secondary vs. higher education) as fixed factors and age as a covariate in the prediction of all study variables. Age [$F(9, 38) = 1.17$, $p > .05$ ($\eta^2 = .22$)], gender [$F(9, 38) = 1.46$, $p > .05$ ($\eta^2 = .26$)], as well as education

[3] We redid the main analyses using the IRAP data of those individuals who fulfilled the criteria on at least two sets of (rather than all) test blocks. These results were similar to those obtained with the more stricter criteria.

[4] In addition to the overall *D*-IRAP score, we also calculated four trial type-specific *D*-IRAP scores, one for each of the relations assessed by the satisfaction or desire IRAP (e.g., I am - competent, I am not - competent, I am - incompetent and I am not - incompetent). Analyses with these four specific *D*-IRAP scores were similar to those obtained with the overall *D*-IRAP score.

[$F(9, 38) = 0.76$, $p > .05$ ($\eta^2 = .23$)] were unrelated to the study variables, and as such were excluded from subsequent analyses.

Primary Analyses

Correlational Analyses. We performed a series of bivariate correlations in order to gain insight into the validity of the competence satisfaction IRAP in particular. Table 3[5] displays correlations between the competence satisfaction IRAP, the competence desire IRAP, the corresponding explicit measures, and the variables from the nomological network. A number of findings can be highlighted. First, both IRAPs were positively correlated, indicating that higher levels of competence satisfaction corresponded with higher levels of competence desire at the implicit level. Both IRAPs were unrelated to their explicit counterparts. With respect to the nomological network, the competence satisfaction IRAP only related negatively to contingent self-esteem (which remained marginally significant when controlling for explicit competence satisfaction), whereas the competence desire IRAP was unrelated to all the study variables.

[5] To see whether the order of the IRAPs would make a difference with respect to the correlations between these IRAPs and other constructs as reported in Table 3, we reran these analyses with data either from participants who completed the competence satisfaction IRAP first or from participants who completed the competence desire IRAP first. There were no relevant differences between these correlations and the correlations reported in Table 3, with one exception. That is, there was a positive relation between the competence desire IRAP and explicit self-esteem for those participants who first completed the competence desire IRAP ($r = .34$, $p < .10$), whereas these variables were unrelated for participants who first completed the competence satisfaction IRAP ($r = -.12$, $p > .05$).

Table 3

Descriptives and Correlations between Study Variables (Study 2)

	M	*SD*	1a	1b	2	3	4
1. Competence satisfaction IRAP	0.14	0.20	_		_		
2. Competence desire IRAP	0.16	0.20	.37**	_	_		
3. Competence satisfaction (C)	3.54	0.59	-.07	_	.10	_	
4. Competence desire	3.63	0.74	.16	_	.12	-.14	_
5. PS perfectionism	3.06	0.71	.12	.09	.05	.04	.08
6. EC perfectionism	2.50	0.58	.15	.11	.08	-.45***	.12
7. Explicit self-esteem	2.00	0.38	.03	.13	.10	.72***	-.17
8. Implicit self-esteem	1.60	1.26	-.11	-.09	-.08	.17	-.02
9. Contingent self-esteem	3.59	0.59	-.22†	-.26†	-.11	-.19	.06

Note. Whereas 1a refers to the analyses without controlling for explicit competence satisfaction, 1b refers to the partial correlations controlling for explicit competence satisfaction.

IRAP = Implicit Relational Assessment Procedure. C = Composite score with satisfaction items and reversed frustration-related items. PS = Personal standards. EC = Evaluative concerns.

†$p < .10$. **$p < .01$. ***$p < .001$.

Discussion

Based on the results of Study 2, the competence satisfaction IRAP does not prove to be very useful as an implicit measure of competence satisfaction as it was unrelated to nearly all of the study variables (except for contingent self-esteem) and showed an unexpected positive relation with the competence desire IRAP. However, it must be noted that both IRAPs showed a very low reliability (i.e., .08), especially compared to previous studies finding reliability estimates between .23 and .81 (Gawronski & De Houwer, 2014; Golijani-Moghaddam, Hart, Dawson, 2013). Therefore, these results must be interpreted with caution.

Study 3

Study 3 was designed to build on Study 2 by validating the implicit measures not only in terms of the relation with their explicit counterpart and the nomological network but also in terms of the individuals' current sense of competence after inducing either competence-satisfying or -frustrating feelings. Additionally, whereas the previous two studies focused solely on the competence satisfaction IAT (Study 1) or the competence satisfaction IRAP (Study 2), we included both types of implicit measures in Study 3. Because the focus of our work was on competence satisfaction and because we did not want to burden our participants too much, we included only measures of implicit competence satisfaction and not competence desire. Because the IRAP was proven to be unreliable in Study 2, we made some changes to this measure (see below). Besides examining the correlation between the implicit and explicit measures of competence satisfaction (i.e., *Hypothesis 1*), the relations between the implicit measures and constructs within the nomological network (i.e., *Hypothesis 2*), and the unique predictive value of the implicit measures (i.e., *Hypothesis 3*), we also hypothesized that individuals in the competence satisfaction condition would display higher levels of implicitly assessed competence satisfaction compared to individuals in the competence frustration condition. Additionally, we expected

to find a small to moderate relation between the IAT and IRAP, in accordance with previous studies employing different implicit measures to assess a single phenomenon (e.g., Schüler, Sheldon, Prentice, & Halusic, 2016). Finally, in line with previous studies showing a link between perceived and actual competence (e.g., Bois et al., 2002), we expected a positive relation between the competence satisfaction implicit measures and task performance.

Method

Participants

One hundred and three students (88 female) aged between 18 and 48 years (M = 22.59; SD = 4.98) completed the study in exchange for 10 euro. Regarding educational level, 53 had completed secondary education and 50 had completed higher education.

Procedure

The study consisted of five parts in the following order: (1) the priming of either competence satisfaction or competence frustration; (2) the completion of the IAT and the IRAP (the order was counterbalanced between participants); (3) an assessment of participants' momentary self-reported feelings (i.e., competence satisfaction, personal standards and evaluative concerns perfectionism, explicit and implicit self-esteem, and contingent self-esteem); (4) completion of the letter detection task; and (5) an assessment of task-related competence. At the start of the experimental session, participants gave their written consent. At the end of the session, all participants received a debriefing which explained the deception of the priming manipulation. Ethical approval was obtained from the university's ethical committee. Further, participation was voluntary and all data were processed confidentially.

Priming Manipulation. We randomly assigned participants to two groups in order to prime feelings of competence satisfaction (N = 52) or frustration (N = 51) and administered a modified version of the task as used by Fishbach and Dhar (2005). In their study, participants were dieters who

were asked to rate how distant they were from their ideal weight on a scale that was either wide (i.e., -25 lbs. as an end point) or narrow (-5 lbs. as an end point). The authors found that dieters who rated the distance to their ideal weight on the wide scale (compared to those dieters rating on the narrow scale), reported to have made more progress towards obtaining their ideal weight and more often chose a chocolate bar instead of an apple as a parting gift at the end of the experimental session (Fishbach & Dhar, 2005). In this study, we aimed to manipulate participants' feeling of competence satisfaction or frustration by also employing an atypical rating scale concerning participants' competence beliefs. That is, in both conditions, items were rated on a Likert scale ranging from 1 (*never*), 2 (*very seldom*), 3 (*seldom*), 4 (*sometimes*), to 5 (*often*). Whereas participants in the competence satisfaction condition filled out 8 items concerning their competence satisfaction (e.g., "I felt confident that I could do things well"), participants in the competence frustration condition filled out 8 items concerning competence frustration (e.g., "I had serious doubts about whether I could do things well"). These items were rated with respect to the past year and were, therefore, preceded by the stem "In the past year". For both questionnaires, 4 items were taken from the Basic Psychological Need Satisfaction and Need Frustration scale (Chen et al., 2015), while the other 4 items per questionnaire were self-developed based on SDT's definition of competence. Subsequently, participants were instructed to calculate their average score on this questionnaire (a calculator was available) and to write this score down. As participants were asked to rate the items with respect to the past year and because the rating scale elicited rather high scores, participants were induced to report high scores of either competence satisfaction or competence frustration. To illustrate, participants in the competence satisfaction condition would likely respond to an item such as "In the past year, I felt confident that I could do things well" with a 4 (*sometimes*) or 5 (*often*).

The Letter Detection Task. To assess participants' objective and subjective task-performance, we employed the letter detection task as previously used in the study of Stoeber, Chesterman, and Tarn (2010). Specifically, participants were presented with a 5 x 5 array containing 25 white letters and

numbers, displayed on a black computer screen. Participants were instructed to find the letter "E" within this array and to respond as quickly and as accurately as possible. Specifically, participants were instructed to press the left response key (S; E present) when they found the "E" on the slide and the right response key (M; E absent) when they did not find an "E" on the slide (on an AZERTY key board). To make sure that participants understood the task, they were first presented with 5 practice trials, which were followed by 100 test trials. Task performance was determined by dividing the number of correct responses by the time spent on the test trials. The letter detection task was programmed using the Affect software package (Affect 4).

Measures

Measures identical to the previous studies were used to assess implicit competence satisfaction (IAT), explicit competence satisfaction (α state version = .89), perfectionism (α personal standards = .85 and α evaluative concerns = .85), explicit (α = .86) and implicit (α = .22; based on the correlation between the scores obtained for each initial) self-esteem, and contingent self-esteem (α = .86). There was one difference with respect to the previous assessments of these self-reported constructs. That is, to assess participants' momentary feelings after our priming manipulation, participants were asked to rate the items with respect to how they were currently feeling (i.e., state version) rather than how they felt in general (i.e., trait version). Besides these measures, we also employed a competence satisfaction IRAP and a measure to assess task-related competence (see below).

Competence Satisfaction IRAP. The IRAP used in this study differed from the one used in Study 2 in three important ways. First, we made use of different label and target stimuli. Whereas we focused on self-related (i.e., *I am*) and non-self-related (i.e., *I am not*) label stimuli in our first IRAP (Study 2), we now differed between self-related (i.e., *I find that, I have the feeling that, I think that*) and others-related (i.e., *Other people find that, Other people have the feeling that, Other people think that*) label stimuli. This was done to avoid double negations (e.g., *I am not* + *incompetent*), as was the case for the IRAP used in Study 2, which increase the task's difficulty (Hussey, Thompson, McEnteggart,

Barnes-Holmes, & Barnes-Holmes, 2015). Competence-related target stimuli were 'I can do things well', 'I am proficient in what I do', 'I can achieve my goals', 'I can successfully complete difficult tasks', I am successful', and 'I am competent'. Incompetence-related target stimuli were 'I fail in the things I do', 'I make a lot of mistakes', 'I am a failure', 'I can do nothing right', 'I am not successful', and 'I am incompetent'. The combination of the two self- or other-related label stimuli and the two (in)competence-related target stimuli created four trial types, namely self – competence (e.g., *I find that + I can do things well*), self – incompetence (e.g., *I find that + I fail in the things I do*), others – competence (e.g., *Other people find that + I can do things well*), and others – incompetent (e.g., *Other people find that + I fail in the things I do*). For this study, we only used the data from the first two trial types, as we were interested in the self-views of individuals rather than how they think others perceive them.[6]

Second, in accordance with the different stimuli, we also employed two different rules compared to the first IRAP (of Study 2), namely (1) "Please respond AS IF YOU THINK THAT YOU ARE COMPETENT AND OTHERS THINK THAT YOU ARE INCOMPETENT" (i.e., high self-competence) and (2) "Please respond AS IF YOU THINK THAT YOU ARE INCOMPETENT AND OTHERS THINK THAT YOU ARE COMPETENT" (i.e., low self-competence rule). Finally, to reduce the complexity of the task, the response keys (D and K indicating, respectively, 'True' and 'False') were fixed across trials.

Task-related Competence. A subscale of the Intrinsic Motivation Inventory (Ryan, 1982; Ryan, Koestner, & Deci, 1991) was employed to assess participants' perceived competence with respect to the letter detection task (6 items; e.g., "I think I am pretty good at this activity"; $\alpha = .90$). Items were rated on a scale from 1 (*not at all true*) to 7 (*completely true*).

[6] In addition to the average *D*-IRAP score based on the first two trial types, we also calculated two trial type-specific *D*-IRAP scores (i.e., I am – competent and I am - incompetent). Analyses with these two specific *D*-IRAP scores were similar to those obtained with the overall *D*-IRAP score.

Results

Descriptive Statistics and Preliminary Analyses

Participant Exclusion. First, we inspected participants' IAT responses. The IAT data of one individual was excluded, as her reaction time was 300 ms or less on at least 10% of the trials. With respect to the IRAP, IRAP data of 5 participants were discarded as these individuals failed to fulfill the criteria (i.e., obtaining an accuracy level of at least 80% and a reaction time of 2000 ms or less) after two sets of practice blocks. Regarding the test blocks of the IRAP, we observed that 24 individuals did not fulfill the criteria of having a reaction time of 2000 ms or less and having an accuracy level of at least 75% on all test blocks. Data of these individuals were, therefore, also discarded.[7]

IAT and IRAP. The IAT and the IRAP effect were determined by calculating, respectively, the *D*6 measure and the *D*-IRAP score (Greenwald et al., 2003). Whereas the split-half reliability of the IAT was adequate (α = .76), the IRAP had a rather low reliability (α = .19) (both corrected with the Spearman-Brown formula).

Background Variables. With respect to the background variables, we performed a MANCOVA with gender and education (secondary vs. higher education) as fixed factors and age as a covariate in the prediction of all study variables. Whereas age [$F(11, 57) = 1.06$, $p > .05$ ($\eta^2 = .17$)] and gender [$F(11, 57) = 1.37$, $p > .05$ ($\eta^2 = .21$)] were unrelated to the study variables, education did show a relation with the study variables [$F(11, 57) = 2.66$, $p < .01$ ($\eta^2 = .34$)]. Specifically, participants who completed higher education (compared to secondary education) displayed a higher level of implicit competence satisfaction (IAT: [$F(1, 67) = 4.38$, $p < .05$ ($\eta^2 = .06$)]; IRAP: [$F(1, 67) = 6.86$, $p < .05$ ($\eta^2 = .09$)]), personal standards perfectionism [$F(1, 67) = 4.85$, $p < .05$ ($\eta^2 = .07$)], and implicit self-esteem [$F(1, 67) = 14.59$, $p < .001$ ($\eta^2 = .18$)].

Primary Analyses

[7] We redid the main analyses using the IRAP data of those individuals who fulfilled the criteria on at least two sets of (rather than all) test blocks. These results were similar to those obtained with the more stricter criteria.

Condition Effects. First, by means of a MANOVA (controlling for education) we examined whether there were differences between the competence satisfaction and the competence frustration condition with respect to the competence satisfaction IAT, the competence satisfaction IRAP, the state questionnaires, performance on the letter detection task, and task-related competence. There was indeed an overall effect of condition on these variables, both in the dataset with participants with a usable IAT score [$F(10, 83) = 2.20$, $p < .05$ ($\eta^2 = .21$)] as in the dataset with participants with also a usable IRAP score [$F(10, 60) = 2.77$, $p < .01$ ($\eta^2 = .32$)]. As displayed in Table 4, participants in the competence satisfaction condition had a higher competence satisfaction IRAP score and felt more competent in the letter detection task. There were no other significant differences in the study variables between the two conditions, including no condition differences with respect to the IAT scores.

Correlational Analyses. We also performed bivariate correlations to investigate the relations between the two implicit measures and the other study variables. As displayed in Table 5[8], the competence satisfaction IAT related positively to state competence satisfaction, state explicit self-esteem, and performance on the letter detection task (although this relation was only marginally significant), while the competence satisfaction IRAP only related negatively to state evaluative concerns perfectionism. However, when we controlled for explicit competence satisfaction, the competence satisfaction IAT related marginally significantly to personal standards perfectionism and performance on the letter detection task. The competence satisfaction IRAP remained significantly related to evaluative concerns perfectionism. Finally, both implicit measures were unrelated to one another.

[8] To see whether the order of the IAT and IRAP would make a difference with respect to the correlations between these implicit measures and other constructs as reported in Table 5, we reran these analyses with data either from participants who completed the IAT first or from participants who completed the IRAP first. There were no relevant differences between these correlations and the correlations reported in Table 5, with one exception. That is, there was a positive relation between the IAT and implicit self-esteem for those participants who first completed the IAT ($r = .30$, $p < .10$), whereas these variables were unrelated for participants who first completed the IRAP ($r = .03$, $p > .05$).

Table 4

Comparison of the Means between the Competence Satisfaction Condition and the Competence Frustration Condition (Study 3)

	Satisfaction condition (N = 52)	Frustration condition (N = 51)	Comparison conditions	
	M (*SD*)	*M* (*SD*)	*F*-value	η^2
Competence satisfaction IAT	0.85 (0.35)	0.79 (0.34)	$F(1, 92) = 0.52$	.01
Competence satisfaction IRAP	0.30 (0.26)	0.15 (0.19)	$F(1, 69) = 8.15$**	.11
State competence satisfaction (C)	3.69 (0.67)	3.74 (0.65)	$F(1, 92) = 0.25$	.00
State PS perfectionism	2.87 (0.72)	3.03 (0.85)	$F(1, 92) = 1.34$	.01
State EC perfectionism	2.39 (0.67)	2.33 (0.66)	$F(1, 92) = 0.20$	.00
State explicit self-esteem	3.06 (0.47)	3.08 (0.40)	$F(1, 92) = 0.05$	.00
State implicit self-esteem	1.04 (1.40)	1.21 (1.44)	$F(1, 92) = 0.54$	.01
State contingent self-esteem	3.54 (0.46)	3.54 (0.60)	$F(1, 92) = 0.00$	.00
Letter detection task	0.07 (0.02)	0.06 (0.02)	$F(1, 92) = 1.86$	.02
Task-related competence	4.23 (0.97)	3.61 (0.96)	$F(1, 92) = 9.19$**	.09

Note. IAT = Implicit Association Test. C = Composite score with satisfaction items and reversed frustration-related items. PS = Personal standards. EC = Evaluative concerns. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 5

Descriptives and Correlations between Study Variables (Study 3)

	M	*SD*	1a	1b	2a	2b	3
1. Competence satisfaction IAT	0.80	0.35	_				
2. Competence satisfaction IRAP	0.22	0.24	.06	_	_	_	
3. State competence satisfaction (C)	3.70	0.66	.27**	_	.19	_	_
4. State PS perfectionism	2.94	0.80	.14	.18†	.03	.06	-.08
5. State EC perfectionism	2.36	0.65	-.12	.04	-.28*	-.24*	-.57***
6. State explicit self-esteem	3.06	0.43	.22*	.04	.15	.04	.73***
7. State implicit self-esteem	1.20	1.43	.11	.07	.14	.08	.14
8. State contingent self-esteem	3.52	0.53	-.03	.02	-.08	-.09	-.18†
9. Letter detection task	0.06	0.02	.18†	.18†	.12	.13	.03
10. Task-related competence	3.94	0.99	.09	.04	.10	.07	.18†

Note. Whereas 1a and 2a refer to the analyses without controlling for explicit competence satisfaction, 1b and 2b refer to the partial correlations controlling for explicit competence satisfaction.

IAT = Implicit Association Test. IRAP = Implicit Relational Assessment Procedure. C = Composite score with satisfaction items and reversed frustration-related items. PS = Personal standards. EC = Evaluative concerns.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Discussion

In Study 3, we found that only the competence satisfaction IRAP was effected by the priming manipulation, whereas the competence satisfaction IAT was not. With respect to the relation between both implicit measures, their explicit counterpart, and the constructs within the nomological network, we only found a few significant relations. That is, the competence satisfaction IAT was positively related to explicit competence satisfaction, explicit self-esteem, and task performance and the competence satisfaction IRAP related negatively to evaluative concerns perfectionism. Both implicit measures were unrelated to one another. Whereas the reliability of the IAT was adequate, the IRAP showed a low reliability. In general, these findings point to the potential usefulness of both the competence satisfaction IAT and the IRAP.

Study 4

Similar to Study 3, we also aimed to validate the competence satisfaction IAT experimentally by inducing either feelings of success or feelings of failure. In contrast to Study 3, where we did not find differences in the IAT scores between the two conditions after a rather subtle manipulation of individuals' sense of competence, we now made use of a more explicit manipulation of competence-related feelings. We only focused on the competence satisfaction IAT and not the IRAP, because the IRAP was found to be substantially less reliable than the IAT in the previous studies and the IAT showed more relevant associations with related constructs.

Method

Participants

Seventy-two participants (51 female) aged between 17 and 50 years (M = 19.54; SD = 3.92) completed the study in return for course credits. Individuals were mostly first year bachelor students in psychology (N = 59).

Procedure

At the start of the study, participants gave their written consent. Further, participation was voluntary and all data were processed confidentially. The study consisted of the four following consecutive parts: (1) filling out questionnaires concerning demographics and other constructs not used in the current study; (2) performing a puzzle task in either a success or failure condition; (3) filling out questionnaires concerning their momentary feelings; and (4) a free-choice period. With respect to the puzzle task, participants were randomly assigned to either the success (N = 36) or the failure (N = 36) condition. In both conditions, the puzzle task was described as a test of competence with regard to visual information processing to increase the significance of the task.

The Tangram Puzzle Task. The Tangram Puzzle Task (TPT) consists of seven geometrically different pieces that need to be correctly assembled to form specific homogeneous black figures. First, the experimenter informed participants about the puzzle task and demonstrated how to assemble the pieces to form a specific figure. Subsequently, all participants started with the practice phase in which they were given four minutes to assemble two figures (one easy and one fairly difficult figure). This was followed by the test phase, during which participants needed to solve five puzzles within ten minutes. A success and failure condition were created by varying the standard of success and the level of difficulty of the figures. Specifically, in the success and failure condition, individuals were informed that 50% of their peers could, respectively, correctly assemble *two* and *four* figures within the time limit. Additionally, the puzzle figures of individuals in the failure condition were more difficult, further increasing the likelihood of failing to attain the provided standard. During both the practice and test

phase, participants were instructed to write down whether they had successfully assembled the puzzle before continuing with the next puzzle. Before the test phase (but after the practice phase), the experimenter left the room to go to the adjacent room to observe participants through a one-way mirror. Then, after the test phase, the experimenter reentered the room and provided the participants with the condition-specific feedback. Participants were then asked to complete a set of questionnaires. Subsequently, there was a free-choice period (in which the experimenter left the room and the participant was free to continue puzzling or do another activity). However, the data of this free-choice period were not of relevance for the current study. Finally, participants were debriefed and asked not to discuss the content of the study with fellow students.

Measures

Measures identical to the previous studies were used to assess implicit competence satisfaction (IAT; $\alpha = .80$), explicit competence satisfaction ($\alpha = .88$), and explicit ($\alpha = .89$) and implicit ($\alpha = .51$; based on the correlation between the scores obtained for each initial) self-esteem. Similar to Study 3, participants were asked to rate the items with respect to how they were currently feeling (i.e., state version) rather than how they felt in general (i.e., trait version) as to assess participants' momentary feelings after our manipulation (i.e., the TPT). Whereas previously explicit self-esteem was rated on a 4-point scale, participants now rated the items on a 10-point scale to have a more sensitive assessment of their current self-evaluations. All questionnaires were administered after the puzzle task. Besides these measures, we also employed a measure to assess task-related competence (see below).

Puzzle Task-related Competence. A subscale of the Intrinsic Motivation Inventory (Ryan, 1982; Ryan et al., 1991) was employed to assess perceived competence with respect to the puzzle task (2 items; e.g., "I think I knew well how I could make the puzzles"; $\alpha = .84$). Items were rated on a scale from 1 (*not at all true*) to 7 (*completely true*).

Results

Descriptive Statistics and Preliminary Analyses

Participant Exclusion. Similar to Study 1 and 3, we inspected participants' IAT responses. There were no participants who had a reaction time of 300 ms or less on at least 10% of the trials, such that data of all participants could be retained. Next, the IAT effect was determined by calculating the *D*6 measure (Greenwald et al., 2003).

Background Variables. With respect to the background variables, we performed a MANCOVA with gender as a fixed factor and age as a covariate in the prediction of all study variables. Whereas gender was unrelated to the study variables [$F(5, 59) = 1.60$, $p > .05$ ($\eta^2 = .12$)], age did show a relation with the study variables [$F(5, 59) = 2.47$, $p < .05$ ($\eta^2 = .17$)]. Specifically, older individuals displayed a lower level of implicit self-esteem [$F(1, 63) = 7.88$, $p < .01$ ($\eta^2 = .11$)].

Primary Analyses

Condition Effects. First, by means of a MANCOVA (controlling for age) we examined whether there were differences between the success and failure condition in the scores on the competence satisfaction IAT and the state questionnaires (i.e., puzzle-task related competence, competence satisfaction, and explicit and implicit self-esteem). There was indeed an overall effect of condition on these variables [$F(5, 59) = 15.26$, $p < .001$ ($\eta^2 = .56$)]. As displayed in Table 6, there was a significant difference between the two conditions with regard to implicit competence satisfaction (only marginally significant) and puzzle task-related competence. More specifically, participants in the success condition unexpectedly displayed a lower level of implicitly assessed competence, but a higher level of puzzle task-related competence.

Table 6

Comparison of the Means between the Success Condition and the Failure Condition (Study 4)

	Success condition (N = 36)	Failure condition (N = 36)	Comparison conditions	
	M (*SD*)	*M* (*SD*)	*F*(1,63)-value	η^2
Competence satisfaction IAT	0.73 (0.31)	0.84 (0.27)	3.48†	.05
Puzzle task-related competence	3.97 (1.24)	1.74 (0.95)	66.15***	.51
State competence satisfaction (C)	3.37 (0.58)	3.33 (0.65)	0.04	.00
State explicit self-esteem	7.53 (1.23)	7.24 (1.45)	0.87	.01
State implicit self-esteem	1.64 (1.55)	1.21 (1.77)	0.60	.01

Note. IAT = Implicit Association Test. C = Composite score with satisfaction items and reversed frustration-related items.

†$p < .10$. ***$p < .001$.

Table 7

Descriptives and Correlations between Study Variables (Study 4)

	M	*SD*	1a	1b	2	3
1. Competence satisfaction IAT	0.79	0.29	_	_		
2. Puzzle task-related competence	2.78	1.57	-.12	_	_	
3. State competence satisfaction (C)	3.40	0.64	.19	_	.14	_
4. State explicit self-esteem	7.43	1.34	.09	-.03	.19	.77***
5. State implicit self-esteem	1.41	1.67	.23†	.22†	-.02	.07

Note. Whereas 1a refers to the analyses without controlling for explicit competence satisfaction, 1b refers to the partial correlations controlling for explicit competence satisfaction.

IAT = Implicit Association Test. C = Composite score with satisfaction items and reversed frustration-related items.

†$p < .10$. ***$p < .001$.

Correlational Analyses. Subsequently, we investigated the relation between the competence satisfaction IAT and the other study variables by means of bivariate correlations. As displayed in Table 7, the competence satisfaction IAT only related positively to implicit self-esteem (although this relation was only marginally significant), but was unrelated to the other variables. The same pattern was observed when controlling for explicit competence satisfaction. Finally, explicit competence satisfaction related positively to explicit (but not implicit) self-esteem.

Discussion

Although the level of task-specific competence was higher in the success than in the failure condition, the score on the competence satisfaction IAT was lower (indicating less competence) in the success than failure condition. Note, however, that this effect was only marginally significant. Together with the finding that there were no between-condition differences on most of the study variables (i.e., explicit competence satisfaction and explicit and implicit self-esteem), the condition-difference on implicit competence satisfaction must be interpreted with caution. Finally, with respect to the nomological network, we found only a (marginally significant) relation between the competence satisfaction IAT and implicit self-esteem.

Study 5

Study 5 aimed to extend previous studies by focusing on a clinical (rather than a student) population to examine the validity of the competence satisfaction IAT. As higher levels of eating disorder symptoms have been found to relate to a lower perceived self-competence (Kerremans, Claes, & Bijttebier, 2010) and a lower social competence (Arroyo & Segrin, 2013), competence seems to be a prominent and relevant construct in a population of patients with an eating disorder. Therefore, we included a sample of patients with an eating disorder in Study 5.

Method

Participants

One hundred and nineteen women aged between 14 and 39 years (M = 21.81; SD = 6.13) who were hospitalized for an inpatient treatment for eating disorders in a Belgian clinic (for more information concerning the treatment see Van der Kaap-Deeder, Vansteenkiste, Soenens, Verstuyf, Boone, & Smets, 2014) completed the study. Eating disorder diagnoses were based on criteria of the DSM-IV (American Psychiatric Association, 1994) determined by a questionnaire (i.e., the Eating Disorders Evaluation Scale; Vandereycken, 1993) and a clinical interview by a psychiatrist. The diagnoses obtained were as follows: 53 (47.7%) belonged to anorexia nervosa, 14 (12.6%) to bulimia nervosa, and 44 (39.6%) to eating disorder not otherwise specified. Patients' highest obtained educational degree was as follows: 15 (13.9%) completed only elementary school, 65 (60.2%) had secondary education, 28 (25.9%) had post-secondary education.

Procedure

Participation was anonymous and voluntary. Furthermore, patients (and, in case of minors, the parents) gave their written consent. Subsequently, they were provided with a link to an online questionnaire, which was filled out about one week after the start of the treatment. The university Institutional Review Board and the Ethical Committee of the hospital gave approval for the study.

Measures

Measures identical to the previous studies were used to assess implicit competence satisfaction (IAT; α = .86), explicit competence satisfaction (α = .84), perfectionism (α personal standards = .83 and α evaluative concerns = .93), and explicit self-esteem (α = .89) (all trait versions). Additionally, patient characteristics (i.e., education and eating disorder diagnosis) were collected through clinical records provided by the staff. Besides these measures, we also assessed eating disorder symptoms (see below).

Eating Disorder Symptoms. We employed three subscales from the Eating Disorder Inventory-II (EDI-II; Garner, 1991) to assess participants' eating disorder symptoms. The Bulimia subscale (7 items; e.g., "I have episodes of eating in which I feel like I cannot stop eating") measures individuals' tendency to engage in or think about overeating and was found to be reliable ($\alpha = .90$). We also employed the Body Dissatisfaction subscale (9 items; e.g., "I think my hips are too big") to asses participants' dissatisfaction with certain body parts. This scale was reliable ($\alpha = .88$). Finally, the Drive for Thinness subscale (7 items; e.g., "I am terrified of gaining weight") was used to assess the preoccupation with dieting and weight and this scale was also found to be reliable ($\alpha = .88$). Items were rated on a 6-point Likert scale, ranging from 1 (*never*) to 6 (*always*).

Results

Descriptive Statistics and Preliminary Analyses

Participant Exclusion. Similar to Study 1, 3, and 4, we inspected participants' IAT responses. There were two participants who had a reaction time of 300 ms or less on at least 10% of the trials. Therefore, data of these individuals were removed. Next, the IAT effect was determined by calculating the *D*6 measure (Greenwald et al., 2003).

Background Variables. We performed a MANCOVA with education and eating disorder diagnosis as fixed factors and age as a covariate in the prediction of all study variables. Whereas education [$F(16, 150) = 1.38$, $p > .05$ ($\eta^2 = .13$)] and age [$F(8, 74) = 0.63$, $p > .05$ ($\eta^2 = .06$)] were unrelated to the study variables, eating disorder diagnosis [$F(16, 150) = 1.92$, $p < .05$ ($\eta^2 = .17$)] did relate to the study variables. Specifically, individuals with bulimia nervosa reported the highest level of bulimic symptoms, followed by individuals with the diagnosis "eating disorder not otherwise specified" and then individuals with anorexia nervosa [$F(2, 81) = 8.85$, $p < .001$ ($\eta^2 = .18$)].

Primary Analyses

Correlational Analyses. We examined the relation between the competence satisfaction IAT and the other study variables by means of bivariate correlations. As displayed in Table 8, the competence satisfaction IAT only related negatively to bulimic symptoms (marginally significant). This pattern was unchanged when controlling for explicit competence satisfaction. Explicit competence satisfaction, in contrast, related positively to explicit self-esteem and negatively to personal standards perfectionism, evaluative concerns perfectionism, body dissatisfaction and drive for thinness.

Discussion

Results of Study 5 showed that the competence satisfaction IAT only related to one of the seven assessed constructs, namely bulimic symptoms. In contrast to the findings of our previous studies, the IAT was thus unrelated to its explicit counterpart and concepts from its nomological network (i.e., perfectionism indicators and explicit self-esteem). Similar to previous studies, the IAT showed an adequate reliability.

Table 8

Descriptives and Correlations between Study Variables (Study 5)

	M	*SD*	1a	1b	2
1. Competence satisfaction IAT	0.67	0.33	_		
2. Competence satisfaction (C)	2.38	0.71	.04	_	_
3. PS perfectionism	3.89	0.67	.11	.13	-.34***
4. EC perfectionism	3.74	0.84	.05	.11	-.70***
5. Explicit self-esteem	2.25	0.76	.11	.14	.81***
6. Bulimia	2.76	1.30	-.18†	-.18†	-.13
7. Body dissatisfaction	4.84	0.94	-.16	-.15	-.27**
8. Drive for thinness	4.90	0.97	-.01	.01	-.35***

Note. Whereas 1a refers to the analyses without controlling for explicit competence satisfaction, 1b refers to the partial correlations controlling for explicit competence satisfaction.

IAT = Implicit Association Test. C = Composite score with satisfaction items and reversed frustration-related items. PS = Personal standards. EC = Evaluative concerns.

†$p < .10$. **$p < .01$. ***$p < .001$.

General Discussion

The main aim of this study was to develop and validate an implicit measure of competence satisfaction. This aim was pursued in several ways, namely by (a) relating the implicit measure to its explicit counterpart; (b) investigating the relation with the nomological network; and (c) examining the unique predictive value of the implicit measure. For this purpose, we developed both a competence satisfaction relational IAT and a competence satisfaction IRAP. Overall, the findings show some evidence for the reliability and validity of especially the competence satisfaction IAT, but less evidence for the unique predictive value of this measure.

The Discriminant Validity of the Implicit Competence Satisfaction Measures

In the present research, we aimed to tap into the *satisfaction* of the need for competence rather than the mere presence of an association between competence and the self. Specifically, we examined whether participants would discriminate between propositions reflecting satisfaction of the need for competence (i.e., I am competent or incompetent) and propositions reflecting a desire for competence (i.e., I desire to be competent or incompetent). Attesting to the discriminant validity of the IAT, Study 1 showed that findings of the competence satisfaction and competence desire IAT did not parallel each other. Most importantly in this regard, while individuals in the evaluative concerns perfectionistic group reported greater implicit desire than individuals in the personal standards perfectionistic group, these groups did not differ with regard to their score on implicit competence satisfaction. This finding is in line with the results of Remue et al. (2013) who showed that dysphoric individuals responded differently to two implicit measures differing with respect to the employed propositions (i.e., 'I am' vs. 'I want to be'). Further, the competence satisfaction IAT and the competence desire IAT were unrelated and the implicit satisfaction IAT related more systematically to outcomes than the implicit desire IAT. Overall, this differential pattern of findings provides initial evidence for the claim that these two IATs assess different constructs. At a broader level, these findings point to the relevance of including propositions in the IAT (and other implicit measures) (see De Houwer, 2014, and Hughes,

Barnes-Holmes, & De Houwer, 2011, for in-depth discussions of the advantages of a propositional perspective on implicit measures). The discriminant validity of the competence satisfaction IRAP, however, was less clear as this measure related moderately to the competence desire IRAP (Study 2). Additionally, this relation was positive which contrasts with previous research showing competence desire to be related to competence frustration (Sheldon & Gunz, 2009).

The Relation between the Implicit Measures and their Explicit Counterpart

We found some evidence for an association between the implicit and explicit measure of competence satisfaction, but only for the competence satisfaction IAT. Specifically, we found a significant correlation between the competence satisfaction IAT and the explicit measure of competence satisfaction in Study 1 and 3, but not in Study 4 and 5. The size of the correlations (i.e., .31 and .27, respectively) in these first two studies was comparable with the mean correlation of .24 between the IAT and its explicit counterpart as found in a meta-analysis by Hoffmann et al. (2005). The absence of such a correlation in Study 5 could be due to the topic of competence being more sensitive among patients with an eating disorder (compared to a more general population), as they are more likely to perceive themselves as less competent (Kerremans et al., 2010). Indeed, Hoffmann et al. (2005) concluded that for such sensitive topics where individuals are less forthcoming in disclosing how they feel about this topic, the correlation between the IAT and the explicit measure decreases. With respect to the competence satisfaction IRAP, there was no relation with its explicit counterpart in both Study 2 and 3. This might be due to the low reliability of the IRAP in both studies indicating that this measure was internally inconsistent which obscures the meaning of the relation with its explicit counterpart. Also, there was possibly less conceptual overlap between the IRAP and the explicit measure compared to the overlap between the IAT and its explicit counterpart, which has been found to reduce the size of the implicit-explicit correlation (Hoffmann et al., 2005).

Findings concerning the Nomological Network

As for the nomological network surrounding competence, especially the competence satisfaction IAT (but not the IRAP) was found to be related to a number of relevant concepts, of which the strongest relations were observed with respect to the self-esteem indicators. Specifically, we found that in more than half of the studies a higher level on the competence satisfaction IAT related to higher levels of explicit (Study 1 and 3, but not Study 4 and 5) and implicit (Study 1 and 4, but not Study 3) self-esteem. This complements the study by Heppner et al. (2008) by showing that the well-established relation between competence and self-esteem mostly holds up when one or both of these constructs are assessed implicitly. Further, whereas the IAT related negatively to contingent self-esteem in Study 1, there was no relation in Study 3. Across the studies, the IAT was unrelated to both personal standards (although there was a marginally significant relation after controlling for explicit competence satisfaction in Study 3) and evaluative concerns perfectionism. Moreover, in line with previous studies finding explicit subjective competence to relate to objective competence (e.g., Bois et al., 2002), we found a relation between the IAT and performance on the letter detection task in Study 3. However, we found no relation between the IAT and objective academic achievement as assessed in Study 1. Finally, we found the competence satisfaction to be weakly related to eating disorder symptoms among patients with an eating disorder (Study 5), with only a marginally significant relation between this IAT and bulimic symptoms. Overall, the observed relations between the IAT and these constructs decreased somewhat but remained significant when controlling for explicit competence satisfaction.

The relation between the IRAP and constructs of the nomological network was substantially less strong compared to those relations between the IAT and these constructs. Specifically, the IRAP only related to contingent self-esteem in Study 2 and to evaluative concerns perfectionism in Study 3. There were no significant relations between the IRAP and the self-esteem indicators, personal standards perfectionism, and performance in both of these studies. This might be due to the IRAP being

weakly related to the concept of competence or due to the low reliabilities of both competence satisfaction IRAPs.

In Study 3 and 4 we manipulated participants' competence feelings, either rather subtle (through a priming task) or more obvious (through a puzzle task). Whereas the IRAP was affected by the manipulation in the expected way (Study 3), there were no (Study 3) or unexpected (Study 4) condition differences with respect to the IAT. Thus, the competence satisfaction IRAP seems to be more sensitive to changes in individuals' situational feelings than the competence satisfaction IAT. Perhaps, the IRAP could be regarded more as a state measure of competence satisfaction and the IAT more as a trait measure, which seems to correspond to the stronger relation between the IAT and trait measures of constructs in the nomological network. This could also explain why the IAT and IRAP were found to be unrelated in Study 3. Future research is needed to test this idea.

Limitations

The current studies had several limitations. First, the sample sizes across the studies were relatively small and consisted mostly of women and university students. These small and rather homogeneous samples limit the generalizability of our findings. It would be interesting for future research to examine the validity of the implicit measures of competence using larger and more heterogeneous samples of participants differing in important sociodemographic characteristics such as age, sex, level of education, and cultural background. Also, we must note that the observed significant relations must be interpreted with caution as we ran, across all five studies, multiple analyses which increases the chances on a type I error. Finally, all studies made use of a cross-sectional design, either experimental or non-experimental, thereby shedding no light on the dynamics of implicitly assessed competence over time.

Directions for Future Research

Future studies could build further on the present results in several ways, where the competence satisfaction IAT seems to be most promising in light of the current results. First, there is a need for

further validation of the competence satisfaction IAT, for example by further exploring its predictive validity. Previous research has shown that implicit measures are especially valuable when predicting behavior occurring under reduced cognitive capacity (Gawronski, 2009). Therefore, it would be interesting to investigate the value of the competence satisfaction IAT in predicting spontaneous behaviors (i.e., behaviors executed without much executive control) or behaviors that are conducted under pressure. Asendorpf, Banse, and Mucke (2002), for instance, found an IAT measuring shyness to predict spontaneous/uncontrolled behaviors of shyness (e.g., tensed body), but not controlled behaviors of shyness (e.g., speech). Additionally, Brunstein and Schmitt (2004) found that an IAT measuring achievement motivation predicted test performance. Taking a broader perspective, one might expect that the competence satisfaction IAT has unique value when it comes to predicting behaviors in clinical groups characterized by lower levels of cognitive control (e.g., individuals with a substance abuse disorder).

In addition to addressing further validation, future studies could focus on adapting this competence satisfaction IAT to specific domains. For example, currently, the competence satisfaction IAT aims to measure general competence. However, results showed that this IAT did not relate to domain-specific competence (i.e., academic competence). Future studies could therefore adapt the competence satisfaction IAT to assess domain-specific competencies. Additionally, future studies could expand the propositional IAT approach to the other two basic psychological needs as proposed by SDT (Deci & Ryan, 2000), that is, relatedness and autonomy. Although past research has looked into these concepts by means of an IAT (e.g., for autonomy Keatley, Clarke, & Hagger, 2012), propositions have not been incorporated in such IATs. Based on the results of the present study and the study by Remue et al. (2013), this could have an important additional value in SDT research.

Conclusion

This study showed that the competence satisfaction IAT (but not the competence satisfaction IRAP) has potential usefulness as an implicit measure of the need for competence. Specifically, this

IAT was shown to be reliable, to display discriminant validity, to relate to its explicit counterpart, and to meaningfully relate to concepts from its nomological network (mostly self-esteem). Future research is needed on the unique predictive value of this implicit measure.

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Children's Daily Well-being: The Role of Mothers', Teachers', and Siblings' Autonomy Support and Psychological Control[1]

This study examined the unique relations between multiple sources (i.e., mothers, teachers, and siblings) of perceived daily autonomy support and psychological control and children's basic psychological needs and well-being. During 5 consecutive days, two children from 154 families (*M*age youngest child = 8.54 years; *SD* = .89 and *M*age oldest child = 10.38 years; *SD* = .87) provided daily ratings of the study variables. Multilevel analyses showed that each of the sources of perceived autonomy support and psychological control related uniquely to changes in daily well-being and ill-being. These associations were mediated by experienced psychological need satisfaction and frustration, respectively. Overall, the findings testify to the dynamic role of autonomy support in children's development. Implications for future research are discussed.

[1] Van der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., & Mabbe, E. (2016). Children's daily well-being: The role of mothers', teachers', and siblings' autonomy support and psychological control. *Developmental Psychology.* doi: 10.1037/dev0000218

Introduction

Essential for the healthy psychological development of children is an autonomy-supportive social environment, in which children are encouraged and helped to experience a sense of true ownership regarding their thoughts, feelings, and behaviors (Ryan, Deci, & Vansteenkiste, 2016). Many studies have demonstrated the beneficial effects of an autonomy-supportive environment for children's psychosocial adjustment (e.g., Grolnick, Ryan, & Deci, 1991), while a controlling context has been found to be detrimental for children's psychological functioning (Soenens & Vansteenkiste, 2010).

Most studies, however, have focused on one particular source of autonomy support instead of considering the unique relations between multiple sources and children's psychological functioning. In this study we simultaneously considered the role of mothers, teachers, and siblings. Each of these three types of relationships has unique features, with the mother-child and teacher-child relationships being more vertical in nature and with the sibling-relationship being more horizontal in nature (Dunn, 2015; Maccoby, 2015). Still, as explained below, they can all be characterized in terms of autonomy support and psychological control and they may all have unique associations with child outcomes. Moreover, there is likely substantial daily variation in the degree to which children experience these three sources as autonomy-supportive or controlling, a topic which has not been investigated systematically before. To draw a more dynamic picture of the role of these three social sources, this study relied on a diary methodology. The study is grounded in Self-Determination Theory (SDT; Deci & Ryan, 2000), a broad theory on human motivation and socialization, according to which the presumed well-being benefits of perceived autonomy support can be accounted for by the satisfaction of children's basic psychological needs for autonomy, competence, and relatedness.

The Importance of Children's Psychological Needs for Psychosocial Adjustment

SDT maintains that all individuals are endowed with three psychological needs, that is, the needs for autonomy, competence, and relatedness. While satisfaction of these needs contributes to

children's thriving and growth, the frustration of these same needs is said to engender maladaptive and even psychopathological functioning (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). The need for autonomy concerns experiencing a sense of volition when carrying out activities. While satisfaction of this need is apparent when children experience the freedom to be themselves, frustration of this need involves feeling obliged to act, think, or feel in a certain way. The need for competence entails experiences of mastery in executing daily activities and feeling effective in coping with challenges. This need is satisfied when children feel proficient when performing tasks, while it is frustrated when children feel like a failure. Finally, the need for relatedness involves having warm and trustful relationships. The need for relatedness is satisfied when children feel connected with important others, whereas this need is frustrated when children feel isolated.

The satisfaction of these psychological needs yields diverse benefits (e.g., engagement and well-being), while the frustration of these needs relates to a variety of adverse outcomes (e.g., problem behavior, ill-being; see Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). These findings emerged across cultures (e.g., in countries as culturally diverse as Belgium, China, USA, and Peru) and even for individuals attaching low importance to the satisfaction of these needs (Chen et al., 2015). Studies on need satisfaction and need frustration among elementary school children are scarce. This is unfortunate because it can be argued that the psychological needs play an important role in the way children cope with the multiple developmental challenges of middle childhood (Veronneau, Koestner, & Abela, 2005). More specifically, driven by a combination of increasing demands for performance at school and by the maturation of information-processing abilities (e.g., attention, executive functioning, and memory), elementary school children are rapidly developing cognitive skills (e.g., Kail, 1991). Also, their social network is broadened, with friendships gaining importance and with peer groups becoming larger and more complex (e.g., Ladd, 1999). In one of the few studies addressing the importance of the needs for elementary school children, Véronneau et al. (2005) showed that need satisfaction related

positively to well-being and to positive affect among 3rd to 7th graders. Moreover, autonomy and relatedness satisfaction were related negatively to negative affect and competence satisfaction was related negatively to depressive symptoms. Similarly, Emery, Toste, and Heath (2015) showed that competence satisfaction in particular was related negatively to depressive symptoms in middle childhood. Although need satisfaction is stated to be universally beneficial within SDT (Deci & Ryan, 2000), more research is needed to determine whether this also applies to younger age groups (such as elementary school children).

Apart from being limited in number, previous studies among children exclusively focused on experiences of need satisfaction. Yet, it is important to investigate the potentially distinct role of need frustration because the mere absence of need satisfaction does not necessarily involve the presence of need frustration. Conversely, the absence of need frustration does not imply the presence of need satisfaction. To illustrate, although siblings can feel as if they have little in common (i.e., low relatedness satisfaction), this does not mean that they feel isolated and actively excluded by the other sibling (i.e., high relatedness frustration). Consistent with this reasoning, recent studies among adolescent athletes (Bartholomew et al., 2011) and among secondary school students (Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015) indicated that need satisfaction and need frustration represent relatively distinct constructs. That is, while need satisfaction was particularly predictive of positive developmental outcomes, including vitality, positive affect, and autonomous motivation, need frustration was particularly predictive of maladjustment and psychopathology, including disordered eating, burnout, and depression (Bartholomew et al., 2011; Haerens et al., 2015).

Autonomy-Supportive and Psychologically Controlling Social Environments

Within SDT, it is argued that need satisfaction can be fostered through autonomy support from key socialization figures and that need frustration is engendered by a controlling social environment (Grolnick et al., 1991; Vansteenkiste & Ryan, 2013). Autonomy support involves the nurturance of volitional functioning in children (e.g., Grolnick et al., 1991; Ryan et al., 2016). Autonomy-supportive

socializing agents take an active interest in and work from the frame of reference of the child. Doing so helps them to provide child-attuned choices, to stimulate the child to take initiative at his or her own pace of development, and to provide rationales that are meaningful to the child (Grolnick et al., 1991; Soenens & Vansteenkiste, 2010). In contrast, autonomy-suppressing environments are characterized by a controlling style of interaction. Controlling socialization figures minimize, ignore, or deny the child's perspective, thereby imposing their own viewpoint by making use of a variety of domineering strategies (Grolnick & Pomerantz, 2009). One of the most frequently studied forms of a controlling style is psychological control, an interaction style characterized by intrusive and manipulative tactics such as guilt induction, shaming, and love withdrawal (Barber, 1996; Soenens & Vansteenkiste, 2010).

Paralleling the theoretical and empirical distinction between need satisfaction and need frustration, the absence of autonomy support does not imply the presence of psychological control. For instance, the absence of choice (i.e., low autonomy support) is different from forcing a child to behave in a certain way (i.e., high control). Conversely, the lack of psychological control does not imply the presence of autonomy support. In sum, recent theorizing suggests a distinction between a bright pathway (where autonomy support is related to adaptive outcomes via need satisfaction) and a dark pathway (where psychological control is related to maladjustment via need frustration).

Research has shown that perceived autonomy support from key socialization figures is related to adjustment in children through the satisfaction of the psychological needs (e.g., Grolnick, Kurowski, Dunlap, & Hevey, 2000; Taylor & Ntoumanis, 2007). In contrast, (psychological) control has been found to relate particularly to adverse outcomes through the frustration of the psychological needs (e.g., Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Mabbe, Soenens, Vansteenkiste, & Van Leeuwen, 2016). However, because most studies to date have focused either on autonomy support or on psychological control or have relied on composite scores reflecting autonomy support versus psychological control (but see Costa, Cuzzocrea, Gugliandolo, & Larcan, in press for an exception), it remains unclear whether autonomy support and psychological control represent distinct constructs,

each involved in a distinct pathway to child outcomes. Also, because most studies focused on one single key socialization figure (e.g., parent or teacher), the relative contribution of different socialization figures' autonomy-supportive and controlling styles has remained understudied. In this study we focus on the unique role of three important socialization figures in children's lives, namely mothers, teachers, and siblings.

The Role of Parents, Teachers, and Siblings

These three relationships differ in terms of their nature and developmental functions. As for their nature, the relationship with parents and teachers is rather vertical (e.g., Maccoby, 2015), whereas the relationship with siblings is relatively more horizontal and egalitarian (Dunn, 2015). Still, differences in power do exist between siblings. Indeed, Buhrmester and Furman (1990) showed that children perceived their older siblings to be both more domineering and nurturing.

In terms of their developmental functions, relationships with teachers clearly play a key role in children's lives in middle childhood, a developmental period in which the development of a sense of competence in school represents a key psychosocial task (Erikson, 1968). Teachers facilitate the acquisition and development of important cognitive skills and at the same time serve as a source of emotional support when difficulties arise during the learning process or in the context of children's social adjustment at school (Hamre & Pianta, 2005; Hughes, Cavell, & Wilson, 2001; Verschueren, 2015). During this developmental period, parents are also important reference figures in children's lives (Collins, Madsen, & Susman-Stillman, 2002), fulfilling an even broader variety of roles than teachers. Parents introduce societally relevant norms and provide the necessary guidance so children learn to take responsibility for their functioning (Maccoby, 2015). Further, parents' role also involves teaching and protecting their children (Grusec & Davidov, 2010). Testifying to the unique importance of both teachers and parents for children's psychosocial adjustment in middle childhood, research has shown that support provided by both parents and teachers contributes to elementary school students' motivation and performance (e.g., Wentzel, 1998).

Siblings also play a number of important roles in children's lives, one of which is to function as a key source of emotional support (Scholte, van Lieshout, & van Aken, 2001). During middle childhood sibling interactions are numerous and highly intense. Indeed, in middle childhood children spend most of their free time with their siblings (Bank & Kahn, 1982; McHale & Crouter, 1996). Moreover, Buhrmester and Furman (1990) showed that in this period sibling relationships are more intense than during adolescence, as indicated by both more closeness and more conflict between siblings.

Despite the differences in the nature and functions of these relationships, it is assumed in SDT that dynamics of autonomy support and psychological control are relevant in every type of relationship. Much like all people have basic psychological needs, all types of relationships can either support or thwart these universal needs (LaGuardia, Ryan, Couchman, & Deci, 2000). As such, the degree of autonomy support and psychological control experienced in each of these relationships may relate to child outcomes.

Unfortunately, most studies on autonomy support and psychological control focused on the role of either parents (e.g., Barber, 1996; Grolnick et al., 1991) or teachers (e.g., Assor et al., 2005). The few studies that focused on siblings found psychological control from adolescent siblings to relate to adjustment problems and reduced self-confidence (Conger, Conger, & Scaramella, 1997) and to anxiety and depressive symptoms (Campione-Barr, Lindell, Bassett Greer, & Rose, 2014). Further, the one available study on perceived autonomy support among siblings showed that siblings whose psychological needs were satisfied were more likely to engage in an autonomy-supportive interaction style towards each other (Van der Kaap-Deeder et al., 2015). Although there are no studies that directly examined the effects of autonomy support among siblings on siblings' psychological functioning, many studies provided evidence for the beneficial effects of high-quality sibling relationships (e.g., Gass, Jenkins, & Dunn, 2007) and for the detrimental effects of negative sibling interactions (e.g., bullying between siblings; Bowes, Wolke, Joinson, Lereya, & Lewis, 2014).

While most studies focused on only one single source of autonomy support, a few studies have included multiple sources. For example, Ferguson, Kasser, and Jahng (2011) showed that autonomy support from both parents (i.e., an averaged score of maternal and paternal autonomy support) and teachers related independently to students' satisfaction with life and school. Guay, Ratelle, Larose, Vallerand, and Vitaro (2013) found that high school students who reported higher levels of autonomy support from their mothers, fathers, and teachers were more autonomously motivated for learning, felt more academically competent, and obtained higher academic grades. Conger et al. (1997) showed that siblings', mothers', and fathers' use of psychological control were related uniquely to maladaptive functioning in adolescents. In short, previous studies including multiple sources have focused mostly on parental and teacher autonomy support, thereby disregarding the potentially supplementary role of siblings above these two socialization figures.

In this study we included two siblings per family. Doing so also enabled us to examine two additional issues. First, it allowed us to look into the possible moderating role of birth order. Although relations between the quality of sibling relationships and psychological adjustment have been found to be similar for younger and older siblings (Kim, McHale, Crouter, & Osgood, 2007), the potential moderating role of birth order has not been examined with regard to autonomy support and psychological control. Second, inclusion of two siblings per family also enabled us to examine whether there exists significant variation at the family-level, meaning that children from one family are more similar with respect to the study variables (e.g., maternal autonomy support) than children from different families.

A Dynamic Perspective on the Psychological Needs and their Social Support

Most studies on the psychological needs and their contextual antecedents have focused on relatively stable differences between individuals. There are, however, also important within-person day-to-day variations in these constructs, suggesting that need satisfaction constitutes a dynamic and malleable experience susceptible to changes in the social environment (Brown & Ryan, 2006).

Research on adults, for example, has shown that there are significant daily fluctuations in need satisfaction, which relate to daily variations in well-being (Ryan, Bernstein, & Brown, 2010). In contrast, daily fluctuations in need frustration among adolescents have been found to relate to daily fluctuations in maladjustment, including binge eating symptoms (Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013). To the best of our knowledge, no similar diary studies have been conducted among children.

Similarly, the contextual support for these needs may also be characterized by substantial day-to-day variance. Previous diary studies on parental behavior have generally found that daily constructive parent-child interaction patterns are related to daily positive emotions in adolescents, whereas negative patterns are related to daily emotional distress (e.g., Chung, Flook, & Fuligni, 2009; Fuligni & Masten, 2010). Only a few studies provided preliminary support for such a dynamic link between autonomy support and child outcomes. Mabbe, Soenens, Vansteenkiste, Van der Kaap-Deeder, and Mouratidis (2016) showed that there is significant daily variation in parental autonomy support and psychological control as reported by the parents themselves. Aunola, Tolvanen, Viljaranta, and Nurmi (2013) showed that daily fluctuations in maternal and paternal psychological control (as reported by the parents) were related to daily fluctuations in children's negative emotions. Similarly, Downey, Purdie and Schaffer-Neitz (1999) found that mothers' reports of negative parenting (including psychological control) related to higher levels of anger experienced among adolescents. Diary studies with regard to parental autonomy support and children's psychological functioning are currently lacking. Also, to the best of our knowledge, there are no studies concerning the daily fluctuations of sibling and teacher autonomy support and psychological control. The present study built on this small literature (a) by examining daily variation in socialization figures' perceived style in three types of relationships at once and (b) by tapping into children's perceptions of daily autonomy support and psychological control. Doing so was deemed important because children's perceptions of socialization

figures' style (rather than the socialization figures' own perceptions) ultimately affect their development and adjustment (Pettit, Laird, Dodge, Bates, & Criss, 2001).

The Present Study

The present study sought to investigate the relations between perceived daily autonomy support and psychological control from three crucial social sources (i.e., mothers, teachers, and siblings) and daily changes in children's psychological functioning as indicated by experienced need satisfaction, need frustration, well-being, and ill-being. We formulated three hypotheses and two more exploratory research questions.

First, we anticipated significant variability in the various constructs being assessed (i.e., contextual influences, psychological needs, outcomes) (Hypothesis 1). Second, we hypothesized that daily variation in perceived autonomy support and psychological control from mothers, teachers, and siblings would relate uniquely to changes in daily variation in children's psychological functioning (i.e., need satisfaction, need frustration, well-being, and ill-being) (Hypothesis 2). We focused on mothers (and not on fathers) because mothers still spend more time with their children nowadays (Bornstein, 2015), in spite of important changes in the specific role and investment of mothers and fathers in children's rearing. As we assessed general (rather than domain-specific) well-being and ill-being as experienced across the day, we did not expect to find significant differences in the strength of the relations (i.e., autonomy support/psychological control to children's psychological functioning) between the three sources. Such differences are more likely to emerge when relying on domain-specific outcomes (with teachers, for instance, being more influential for need satisfaction in the domain of school-related tasks).

Third, we tested a mediation model, thereby examining the possibility of a bright and a dark pathway of socialization. Specifically, we hypothesized that autonomy support would be related most strongly to changes in well-being via experiences of changes in need satisfaction and that psychological

control would be related most strongly to changes in ill-being via experiences of changes in need frustration (Hypothesis 3).

In a more explorative fashion, we also investigated whether person-levels of perceived autonomy support and psychological control, as assessed prior to the diary study, would moderate the associations of perceived daily autonomy support and psychological control with changes in daily experiences of need satisfaction and need frustration (Research Question 1). According to SDT (Deci & Ryan, 2000), people who have had many experiences of need satisfaction in the past may be more sensitive to subsequent similar experiences and, thus, benefit more from experiences of need satisfaction than individuals who generally have had less such experiences. Few studies have empirically addressed this notion of sensitization (see e.g., Moller, Deci, & Elliot, 2010 for an exception). Finally, we explored whether gender, age, and birth order (i.e., being the younger or older sibling) moderated the relations between the study variables (Research Question 2).

Method

Participants and Procedure

In total, 154 families from the Dutch-speaking part of Belgium (Flanders) took part in this study. Two children per family (N = 308 children) participated. The younger sibling was on average 8.54 years old (SD = .89) and the oldest sibling was on average 10.38 years old (SD = .87). All children attended elementary school. Of all children, 55% were female and the gender distribution was similar among younger and older participants (53% girls in the younger group and 56% girls in the older group; χ^2 (1) = .21, p = .65). In most families there were two (49%) or three (33%) children. The majority of mothers (Mage = 39.45, SD = 3.96) followed higher education (78%) and were married (85%).

Families were recruited as part of an undergraduate course in developmental psychology. In exchange for course credits, students were asked to invite two families (who were not relatives or close

friends of the student) with at least two elementary school children between 8 and 12 years old. If a family had more than two children between 8 and 12 years old, students were asked to select those two children that were closest to each other in terms of age. Students were trained in a one-hour information session with the first author to approach potentially interested families and to collect the data. Further assistance during the data-collection, when necessary, was provided to the students via e-mail. Students assisted children in filling out the questionnaires during the home visit. They also explained the diary booklet thoroughly. Children were informed that there were no right or wrong answers, that their answers would be treated in a confidential way, and that they could leave an item unanswered if they were unsure. Additionally, the diary booklet itself also contained elaborate instructions for the child. Children were instructed to fill out the diary questionnaires each day, thereby noting the date and time of each assessment (if the child was unsure about this information, it was stated that he/she could ask help from the parent), and they were also instructed to check for missing answers each day. Students also asked mothers to remind their children to fill out the diary questionnaires each day as to avoid missing cases. Participation was anonymous, voluntary, and families did not obtain any reward. Furthermore, mothers gave their written consent on behalf of their children. This procedure was in accordance with the guidelines and protocol of the university's Ethical Committee.

Questionnaires were administered via a home visit and a diary booklet and were provided in a paper-and-pencil version. The diary booklet was given at the end of the home visit. Although several measures were filled out by the participants during the baseline assessment during the home visit, we only focused on perceived autonomy support and psychological control in the current study. The children were also provided with a diary booklet tapping into perceived daily autonomy support and psychological control from three sources (i.e., mothers, teachers, and siblings), need satisfaction and frustration, and well-being and ill-being. They filled out the daily questionnaires in the evening before bedtime during five consecutive schooldays; questionnaires were not filled out during the weekend as the unique contribution of perceived teacher autonomy support and control cannot be examined on such

days. All items were answered on a Likert scale ranging from 1 (*not at all true*) to 5 (*completely true*). The internal consistencies of all used scales can be found in Table 1.

Table 1

Descriptives of and Correlations between the Study Variables at the Day-Level (Top Half) and Person-Level (Bottom Half)

	α	Range α	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Day-level measures																		
1. AS Mother	.80	.74-.84	-															
2. AS Teacher	.79	.72-.84	.55**	-														
3. AS Sibling	.83	.77-.87	.73**	.40**	-													
4. PC Mother	.68	.57-.77	-.22**	-.02	-.26**	-												
5. PC Teacher	.74	.69-.78	-.06	-.05	-.08	.66**	-											
6. PC Sibling	.72	.68-.80	-.13	.05	-.36**	.71**	.63**	-										
7. Need satisfaction	.72	.60-.77	.47**	.23**	.42**	-.39**	-.27**	-.36**	-									
8. Need frustration	.66	.58-.73	-.23**	-.06	-.28**	.55**	.40**	.45**	-.37**	-								
9. Well-being	.86	.82-.90	.26**	.11	.28**	-.52**	-.39**	-.48**	.62**	-.48**	-							
10. Ill-being	.82	.80-.85	-.12	-.01	-.16	.52**	.41**	.47**	-.44**	.59**	-.82**	-						
Person-level measures																		
11. AS Mother	.60	-	.58**	.38**	.50**	-.15	-.06	-.10	.37**	-.19*	.26**	-.14	-					
12. AS Teacher	.65	-	.35**	.66**	.28**	-.06	-.14	.04	.12	-.10	.13	-.08	.42**	-				
13. AS Sibling	.68	-	.46**	.30**	.57**	-.20*	-.09	-.23**	.33**	-.24**	.24**	-.19**	.53**	.37**	-			
14. PC Mother	.76	-	-.27**	-.12	-.35**	.36**	.29**	.34**	-.26**	.20*	-.20*	.10	-.19*	-.06	-.33**	-		
15. PC Teacher	.73	-	-.12	-.13	-.09	.34**	.52**	.27**	-.22**	.20*	-.22**	.15	-.10	-.12	-.09	.55**	-	
16. PC Sibling	.78	-	-.12	.07	-.25**	.22**	.21*	.43**	-.25**	.23**	-.27**	.21*	-.10	.06	-.32**	.51**	.37**	-
Mean			3.54	2.90	3.33	1.46	1.58	1.84	4.10	2.10	4.37	1.47	3.50	2.90	3.22	2.02	1.82	2.93
SD			.77	.80	.88	.43	.52	.61	.41	.50	.51	.49	.56	.66	.73	.60	.49	.72

Note. AS = Autonomy support; PC = Psychological control.

*$p < .05$; **$p < .01$.

Measures

Person-level measures.

Autonomy Support and Psychological Control: Mother, Teacher, and Sibling. Participants were administered a Dutch version (Vansteenkiste, Zhou, Lens, & Soenens, 2005) of the Autonomy Support Scale of the Perceptions of Parents Scale (POPS; Grolnick et al., 1991). Of the 7 original items, 2 were removed as these assessed psychological control. Furthermore, the 8-item Dutch version (Soenens, Vansteenkiste, Luyckx, & Goossens, 2006) of the Psychological Control Scale – Youth Self-Report (PCS-YSR; Barber, 1996) was used. Items from both scales were slightly simplified to make them appropriate and readable for elementary school children. Moreover, we ensured that the items could be filled out with regard to the mother ('my mother'), teacher ('my teacher'), and sibling ('my brother or sister').

Day-level measures.

Autonomy Support and Psychological Control: Mother, Teacher, and Sibling. Similar to the assessment during the home visit, perceived autonomy support and psychological control were again assessed with, respectively, the POPS (Grolnick et al., 1991) and the PCS-YSR (Barber, 1996). However, we now used two shortened versions of these scales (each containing 4 items) and adapted the items slightly to assess daily autonomy support (e.g., "Today, whenever possible, my mother/teacher/brother or sister allowed me to choose what to do") and psychological control ("Today, my mother/teacher/brother or sister was less friendly with me if I did not see things his or her way"). We selected those items from the autonomy support and psychological control scales that were most suitable for daily assessments. Again, these items were filled out three times, that is, with respect to the mother, teacher, and sibling. All scales were reliable across the five days and within each of the days, as can be noticed in Table 1.

Psychological Need Satisfaction and Need Frustration. The Basic Psychological Need Satisfaction and Need Frustration scale (Chen et al., 2015) was employed to measure the satisfaction

and frustration of the psychological needs for autonomy, competence, and relatedness. We employed a shortened 12-item version of this questionnaire (4 items per need) and adapted them slightly to assess daily need satisfaction and need frustration. Items were also adjusted to match children's reading and comprehension level. For example, "I feel capable doing what I do" was changed into "Today, I was good at what I did". Based on a pilot study among six children (aged between 7 and 12 years old; 3 boys) who were individually tested, we made three additional changes (e.g., "people I care for" was changed into "people I like"). Example items are: "Today, I felt a sense of freedom in the things I did" (i.e., autonomy satisfaction) and "Today, I felt forced to do many things I actually didn't want to do" (i.e., autonomy frustration). The six items tapping into need satisfaction were averaged and the six items tapping into need frustration were averaged. Both sets of scores were found to be internally consistent (Table 1).

Well-being and Ill-being. To assess daily well-being, we used of a short scale which was partly based on the Positive and Negative Affect Schedule for Children (Laurent et al., 1999). Three items tapped into well-being ("I was joyful and excited today", "I was happy today", "Today was a good day") and three items tapped into ill-being ("I felt bad today", "I felt sad today", "Today was a bad day"). Items were averaged per subscale and were found to be reliable (Table 1).

Plan of Analyses

As the data were hierarchically structured, with 5 measurement times (i.e., Level 1) being nested within 308 children (i.e., Level 2), which were nested within 154 families (i.e., Level 3), large dependencies within families and within persons were expected. Therefore, we employed multilevel analyses for our main models. These analyses were performed with the statistical software package MLwiN 2.16 (Rasbash, Steele, Browne, & Goldstein, 2009). All predictor variables were centered around their grand mean to facilitate convergence and interpretation of the models. In total, there were 6.36% missing values in the dataset, most of which were in the diary data (6.17% missing data in the diary data). By default, these missing values were treated as structurally missing (i.e., listwise deletion)

by MlWin.In each of the main models, we started with a random intercepts-only model and then added fixed effects. These random intercepts-only models consist of random intercepts and a constant as the only predictor (Hox, 2010) and decompose the total variation into variation at the family-, person-, and day-level. Further, hypotheses were tested in a conservative fashion by controlling for prior day levels of the outcome. These analyses were conducted on a truncated dataset since the first measurement point (i.e., day 1) has no previous day.

Results

Descriptive Statistics and Preliminary Analyses

Descriptive statistics and bivariate correlations between the study variables, which were aggregated over the five days, can be found in Table 1. The means reveal that on average participants experienced moderate levels of autonomy support, low levels of psychological control, need frustration, and ill-being, and relatively high levels of need satisfaction and well-being. Follow-up paired sample *t*-tests indicated that, for each of the three sources, autonomy support was perceived to be more strongly present than psychological control at the general level and at the daily level, with *t*-values (*df* = 153) ranging between 3.06 and 26.80; all *p*s < .01. With respect to the comparison between the three sources of autonomy support, children perceived their mothers (*t*(153) = 11.10 and 10.50 for the person-level and day-level, respectively) and siblings (*t*(153) = 4.98 and 5.76 for the person-level and day-level, respectively) to be more autonomy-supportive than their teachers, all *p*s < .01. Mothers were perceived to be even more autonomy-supportive than the siblings, *t*(153) = 5.38 and 4.16 for the person-level and day-level, respectively; *p*s < .01. As for psychological control, siblings were perceived to be more controlling than the mothers (*t*(153) = 17.07 and 11.01 for the person-level and day-level, respectively) and teachers (*t*(153) = 19.52 and 6.82 for the person-level and day-level, respectively), all *p*s < .01. At the person-level, mothers were more psychologically controlling than teachers (*t*(153) =

4.75, $p < .01$), whereas at the daily level teachers were perceived to be more psychologically controlling than mothers ($t(153) = 3.49$, $p < .01$).

We also examined, by means of paired-samples *t*-tests, whether both siblings would report equal or different levels of perceived autonomy support and psychological control. Both at the person-level and at the day-level, older siblings reported receiving higher levels of autonomy support from all three sources (*t*-values ranging between -3.42, *p*s < .01), except for sibling autonomy support at the person-level where no difference between the two siblings was found. With regard to psychological control, there were only two differences, with older siblings perceiving less psychological control from their mother at the person-level ($t = 2.33$; $p < .05$) and more psychological control from their sibling at the day-level ($t = -2.15$; $p < .05$). Further, age was related positively to autonomy support from all three sources, both at the person- and day-level (*r* ranging between .19 and .30, *p*s < .05), yet was unrelated to the mediating and outcome variables. Finally, independent-samples *t*-tests indicated that there were no significant gender effects.[2]

Primary Analyses

Hypothesis 1: Daily Variability in the Assessed Constructs. Ten random intercepts-only models were created as to examine the percentage of variance in perceived daily autonomy support and psychological control (from each social source), need satisfaction, need frustration, well-being, and ill-being that is due to within-person (Level 1), between-person (Level 2), or between-family (Level 3)

[2] We also compared mean-level differences in person-level and day-level autonomy support and psychological control from each social source between four groups of sibling dyads: (1) sibling dyads of two sisters ($n = 44$; 28.6%); (2) sibling dyads of two brothers ($n = 30$; 19.5%); (3) sibling dyads of one younger sister and one older brother ($n = 38$; 24.7%); and (4) sibling dyads of one younger brother and one older sister ($n = 42$; 27.3%). Results of a MANOVA showed that there were no differences between these four groups (*F*-values ranging between .12 and 2.48, *p*s > .05), with one exception. Older male siblings reported receiving more autonomy support from their younger sibling if that sibling was also male ($M = 3.82$; $SD = 98$) rather than female ($M = 3.14$; $SD = 1.22$); $F(3,147) = 2.87$, $p < .05$, $\eta^2 = .06$.

variation. Results of these analyses are summarized in Table 2. A number of findings deserve being highlighted.

Intraclass correlations, which represent the percentage of variance in a variable at a specific level, indicated that there was significant variability at each level for each of the study variables. Interestingly, there were some parallels and some divergences with respect to the division of the proportion of variance at these three levels across the assessed constructs. For instance, in all of the outcomes the least amount of variance was situated at the between-family level, varying between 13% and 27%. For half of the constructs, the within-person variance exceeded the between-person variance, whereas for the other half this pattern was reversed. Interestingly, differences in perceived autonomy support were more a function of differences between children than a function of day-to-day variation in the child's functioning, while perceptions of psychological control (with the exception of teacher psychological control) were more subjected to such day-to-day variations. Given the significant variations between days, persons, and families with respect to these variables, a multilevel approach, which takes this hierarchical structure into account, was used in all subsequent analyses.

Table 2

Percentage of Variance in the Study Variables that is due to Within-Person, Between-Person, or Between-Family Variance

	Within-person variance		Between-person variance		Between-family variance	
	χ^2	ICC	χ^2	ICC	χ^2	ICC
Perceived autonomy support						
Mother	454.93**	32%	52.20**	40%	17.62**	27%
Teacher	441.04**	27%	58.79**	54%	8.11**	19%
Sibling	456.14**	27%	57.03**	48%	13.06**	25%
Perceived psychological control						
Mother	451.12**	54%	31.80**	25%	16.60**	21%
Teacher	439.79**	38%	48.88**	41%	12.28**	21%
Sibling	450.49**	45%	39.32**	30%	19.55**	26%
Needs						
Need satisfaction	456.47**	41%	50.59**	46%	4.88*	17%
Need frustration	456.51**	46%	39.22**	30%	18.32**	24%
Adjustment						
Well-being	454.66**	61%	29.37**	26%	9.14**	14%
Ill-being	454.05**	64%	25.97**	23%	9.55**	13%

Note. ICC = Intraclass correlation.

*$p < .05$; **$p < .01$.

Table 3

Summary of the Model Estimates for the Three-Level Analyses of the Associations Between Autonomy Support, Psychological Control, Need Satisfaction, Need Frustration, Well-being, and Ill-being

	Need satisfaction	Need frustration	Well-being		Ill-being	
	Model 1a	Model 1b	Model 1c	Model 2c	Model 1d	Model 2d
Parameter	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*
Overall Intercept	4.12 (.02)**	2.08 (.02)**	3.09 (.12)**	3.78 (.12)**	1.43 (.02)**	1.43 (.03)**
Day-level measures						
AS Mother	.09 (.02)**	-.06 (.03)*	.08 (.03)*	.03 (.03)	-.02 (.03)	.03 (.03)
AS Teacher	.04 (.02)*	-.01 (.02)	.01 (.03)	-.02 (.03)	-.00 (.03)	.01 (.03)
AS Sibling	.04 (.02)*	-.00 (.02)	.06 (.03)*	.04 (.03)	-.04 (.03)	-.03 (.03)
PC Mother	-.13 (.03)**	.23 (.03)**	-.15 (.04)**	-.05 (.04)	.20 (.04)**	.10 (.04)**
PC Teacher	.01 (.03)	.06 (.03)*	-.10 (.04)**	-.11 (.04)**	.13 (.04)**	.12 (.04)**
PC Sibling	-.05 (.02)*	.06 (.03)*	-.05 (.03)	-.03 (.03)	.05 (.03)	.02 (.03)
Need satisfaction				.41 (.04)**		-.24 (.04)**
Need frustration				-.15 (.04)**		.24 (.03)**
Person-level measures						
AS Mother	.03 (.03)	-.01 (.03)	.02 (.04)	-.00 (.05)	.00 (.04)	.02 (.04)
AS Teacher	-.04 (.02)	.01 (.03)	.00 (.04)	.03 (.04)	.00 (.03)	-.01 (.03)
AS Sibling	.00 (.02)	.02 (.03)	-.04 (.03)	-.05 (.04)	.01 (.03)	.00 (.03)
PC Mother	.00 (.03)	.01 (.04)	.03 (.05)	.03 (.05)	-.05 (.04)	-.06 (.04)
PC Teacher	-.05 (.03)	-.07 (.04)	-.01 (.05)	-.00 (.05)	-.00 (.05)	-.00 (.05)
PC Sibling	.00 (.02)	.05 (.03)	-.02 (.03)	-.02 (.04)	.02 (.03)	.00 (.03)
2*loglikelihood	1679.02	2128.17	2733.71	2598.55	2587.64	2465.20

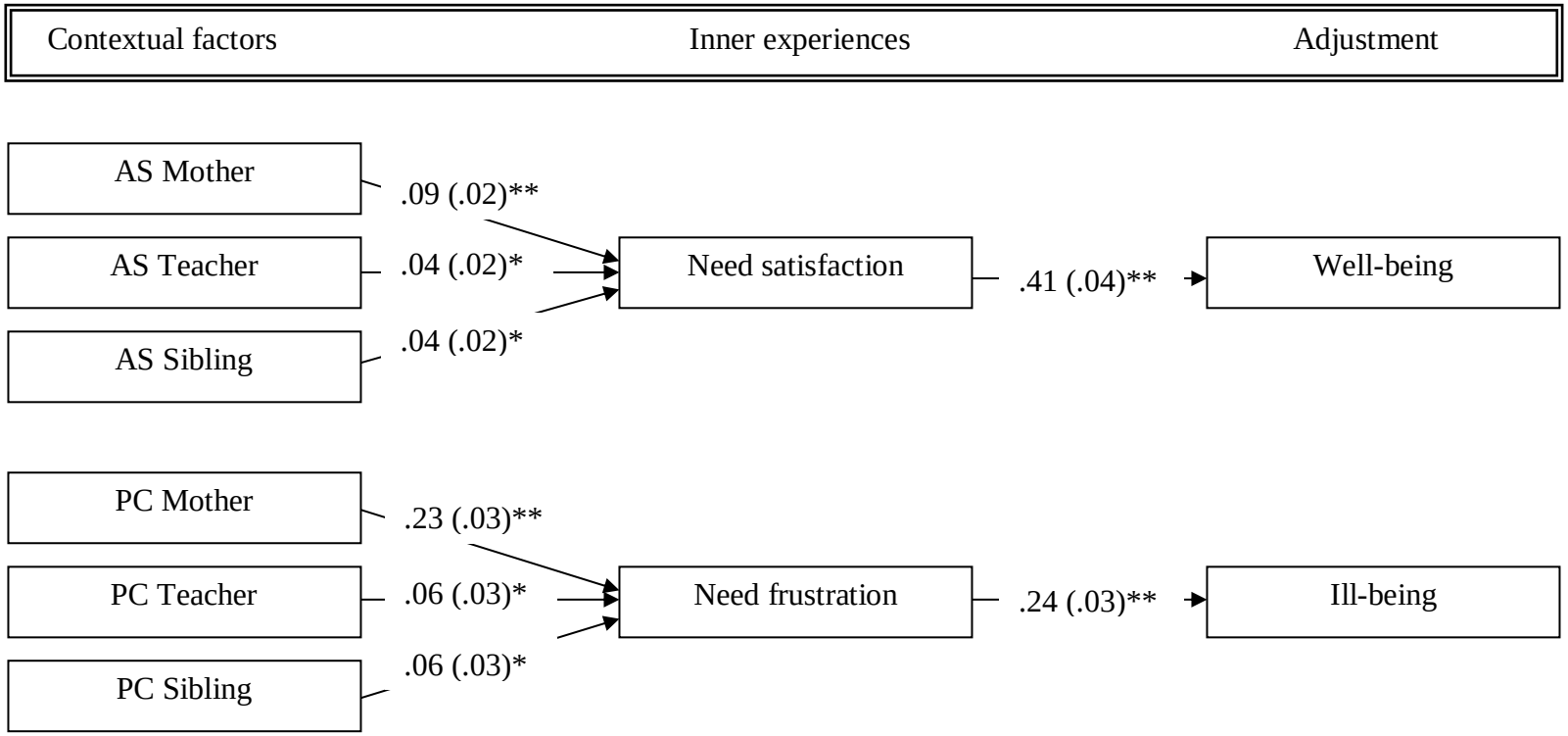
Note. Outcomes of the models are (a) daily need satisfaction, (b) daily need frustration, (c), daily well-being, and (d) daily ill-being. AS = Autonomy support; PC = Psychological control. Coefficients shown are unstandardized path coefficients (*B*) with standard errors (*SE*) reported between brackets. *$p < .05$; **$p < .01$.

Hypothesis 2: The Unique Relations of Perceived Mothers', Teachers', and Siblings' Daily Autonomy Support and Psychological Control. To investigate the unique relations of daily experienced autonomy support and psychological control from the three sources, we analyzed four models, each time including a different outcome, namely daily need satisfaction (Model 1a), daily need frustration (Model 1b), daily well-being (Model 1c), and daily ill-being (Model 1d). Results of these analyses are displayed in Table 3 and a summary of these findings is graphically presented in Figure 1.[3] With respect to the day-level measures, daily autonomy support and psychological control from each social source related uniquely to, respectively, changes in daily need satisfaction and need frustration. Moreover, perceived maternal and sibling psychological control related negatively to changes in need satisfaction, while only maternal autonomy support related negatively to changes in need frustration.

With respect to the outcomes, a similar pattern of findings emerged. Specifically, perceived daily autonomy support from the mothers and siblings (but not from the teachers) related positively to changes in daily well-being, while daily autonomy support did not relate to changes in daily ill-being. Perceived daily psychological control from the mothers and teachers (but not from the siblings) related positively to changes in ill-being and negatively to changes in well-being. With respect to the person-level measures, general levels of experienced autonomy support and psychological control did not relate to the daily measures of need satisfaction, need frustration, well-being and ill-being.

[3] To gain further insight into the role of birth order within the family, we re-ran our main analyses, as reported in Table 3, while only employing data from families with two children as this subsample includes only siblings who were first- and second-born children within their family. Even when controlling for birth order, results of these analyses were similar to those reported here.

Figure 1. A Summary of the Results as reported in Table 3.



Note. Coefficients shown are unstandardized path coefficients with standard errors reported between brackets. Coefficients are based on the results of the models reported in Table 3. AS = Autonomy support; PC = Psychological control. *$p < .05$; **$p < .01$.

Hypothesis 3: The Mediating Role of Need Satisfaction and Need Frustration. Next, we investigated whether the relations between perceived daily autonomy support and psychological control and children's well-being and ill-being (as shown in Model 1c and 1d) can be accounted for by daily need satisfaction and need frustration (as shown in Model 2c and 2d). Specifically, we tested a series of mediation models with (a) need satisfaction playing an intervening role in the relation between perceived autonomy support (of each source) and well-being and (b) need frustration playing an intervening role in the relation between perceived psychological control (of each source) and ill-being. This was done by simultaneously adding daily need satisfaction and need frustration as predictors of well-being and ill-being in addition to autonomy support and psychological control. Results of these analyses are shown in Table 3.

First, daily need satisfaction and need frustration were both strongly related to changes in day-to-day well-being and ill-being. Moreover, the strength of the initial relation between experienced autonomy support and psychological control on the one hand and well-being and ill-being on the other hand was reduced substantially after taking into account the role of daily need satisfaction and frustration (compared to Model 1c and Model 1d). Still, the contribution of maternal and teacher psychological control to ill-being remained significant.

To further investigate the significance of the indirect effect of perceived autonomy support on changes in well-being through need satisfaction and the indirect effect of perceived psychological control on changes in ill-being through need frustration, we performed the product-of-coefficient test (MacKinnon, Fairchild, & Fritz, 2007). When the 95% confidence interval (CI) of this test does not contain zero, then the indirect effect is significant. These results are displayed in Table 4 wherein the upper part refers to the relation autonomy support – need satisfaction – well-being and the lower part refers to the relation psychological control – need frustration – ill-being. First, all a-paths (i.e., perceived autonomy support from each social source to changes in need satisfaction and perceived psychological control of each social source to changes in need frustration) and all b-paths (i.e., changes

in need satisfaction to changes well-being and changes in need frustration to changes in ill-being) were significant. Furthermore, all c-paths (i.e., perceived autonomy support from each social source to changes in well-being and perceived psychological control from each social source to changes in ill-being) were significant, except for teachers' autonomy support and sibling psychological control. When daily need satisfaction and need frustration were taken into account, only two of these paths remained significant (c´-paths). The product-of-coefficient test showed that all indirect effects, except for one (i.e., teacher psychological control – need frustration – ill-being), were significant, indicating that autonomy support was related to changes in well-being through changes in satisfaction of the psychological needs and that psychological control was related to changes in ill-being through changes in frustration of these needs.

Table 4

The Mediating Role of Need Satisfaction or Need Frustration in the Relations between Autonomy Support or Psychological Control and Well-being or Ill-being

	c-path		c´-path		a-path		b-path		a*b	
	B (SE)	95% CI	*B (SE)*	95% CI	*B (SE)*	95% CI	*B (SE)*	95% CI	*B (SE)*	95% CI
Autonomy support – Need satisfaction – Well-being										
Mother	.08 (.03)*	.02,.14	.03 (.03)	-.03,.09	.09 (.02)**	.05,.13	.41 (.04)**	.33,.49	.04 (.01)	.02,.05
Teacher	.01 (.03)	-.05,.06	-.02 (.03)	-.07,.04	.04 (.02)*	.01,.08	.41 (.04)**	.33,.49	.02 (.01)	.00,.03[1]
Sibling	.06 (.03)*	.00,.11	.04 (.03)	-.02,.09	.04 (.02)*	.01,.08	.41 (.04)**	.33,.49	.02 (.01)	.00,.03[2]
Psychological control – Need frustration – Ill-being										
Mother	.20 (.04)**	.12,.27	.10 (.04)**	.03,.18	.23 (.03)**	.17,.30	.24 (.03)**	.17,.30	.06 (.01)	.03,.08
Teacher	.13 (.04)**	.06,.20	.12 (.04)**	.05,.18	.06 (.03)*	.00,.12	.24 (.03)**	.17,.30	.01 (.01)	.00,.03
Sibling	.05 (.03)	-.01,.12	.02 (.03)	-.04,.09	.06 (.03)*	.01,.10	.24 (.03)**	.17,.30	.01 (.01)	.00,.03[3]

Note. Coefficients shown are unstandardized path coefficients (*B*) with standard errors (*SE*) reported between brackets. The a-path is the relation between autonomy support and psychological control and, respectively, need satisfaction and need frustration; the b-path is the relation between need satisfaction and need frustration and, respectively, well-being and ill-being (while controlling for daily autonomy support and psychological control); the c-path is the initial relation between autonomy support and psychological control and, respectively, well-being and ill-being; and the c´-path is the relation between autonomy support and psychological control and, respectively, well-being and ill-being when the b path is taken into account. CI = Confidence interval. [1,2,3]When rounded to three numbers, these confidence intervals are respectively (1) .002,.032, (2) .002,.031, and (3) .002,.027, indicating significant effects. *$p < .05$; **$p < .01$.

Supplementary Analyses: Moderating Factors. We performed four additional analyses per social source that investigated whether person-level autonomy support or person-level psychological control moderated the relation between perceived daily autonomy support and changes in daily need satisfaction or between perceived daily psychological control and changes in daily need frustration. All interaction terms in these twelve analyses were not significant [χ^2 (1) ranging between .04 and 1.07, all *p*s > .05]. Thus, generally experienced autonomy support and psychological control did not moderate the relation between daily autonomy support and daily need satisfaction or the relation between daily psychological control and daily need frustration.

We also investigated whether associations in the models would differ depending on the gender, age, or birth order (i.e., being a younger or older sibling) of the child. Therefore, we examined interactions between these three variables and all the other predictor variables (i.e., day-level as well as person-level variables) in models 1a, 1b, 2c, and 2d. Of the 156 interactions we tested, only 17 were significant [i.e., 11%; χ^2 (1) ranging between .00 and 3.72 for the non-significant interaction terms and ranging between 4.09 and 12.25 for the significant interaction terms]. The significant interactions indicated that the size of the associations was somewhat more pronounced among younger siblings and girls.

Discussion

Fundamental to the optimal psychological development of children is a social environment in which children are encouraged to experience true ownership regarding their thoughts, feelings, and behaviors (i.e., autonomy support) and in which children are not pressured to think, feel, and act in certain ways (e.g., through psychological control). Multiple studies have indicated the beneficial effects of an autonomy-supportive environment for children's psychosocial adjustment (Taylor & Ntoumanis, 2007). In contrast, a psychologically controlling or autonomy-suppressing context has been found to relate to problem behavior (e.g., Barber, 1996). However, this research has typically focused on one

particular source of autonomy support and psychological control and has not adopted a diary approach. Such a diary approach is ideally suited to gain insight in the more dynamic nature of autonomy support and psychological control provided by important figures in children's social environment.

Daily Variation in Autonomy Support and Psychological Control

As a main goal of this study involved investigating the relations between the study variables at the day-to-day level, an important first step was to provide evidence for the existence of significant variation in these constructs at the daily level. Documenting such day-to-day variation was particularly important with regard to the perceived socialization styles used by the three social sources because the role played by socialization figures is often described in a rather static fashion (although there is a recent trend towards a more dynamic view on socialization; e.g., Laurenceau & Bolger, 2005; Repetti, Reynolds, & Sears, 2015).

Results of random intercepts-only models, which decompose the total variation in the study variables into variation at the family-, person-, and day-level (see Table 2), showed that children do experience significant fluctuations in perceived autonomy support and psychological control from mothers, teachers, and siblings over a period of five days. Clearly then, in addition to individual differences between parents, teachers, and siblings, with the one parent/teacher/sibling being generally more autonomy-supportive and controlling than the other, the communication style of socialization figures is characterized by quite a lot of variation on a day-to-day basis. This finding is in contrast with the relatively high rank-order stability of autonomy-supportive parenting (Matte-Gagné, Bernier, & Gagné, 2013) and psychologically controlling parenting (e.g., Barber, 1996) over longer periods of time. These findings point to the importance of taking into account the variability of socialization style across short periods of time and are in line with dynamic models indicating that socialization figures' behavior varies over time and across situations (e.g., Holden & Miller, 1999). These findings also have important implications for prevention and intervention efforts. For instance, as suggested by the current results, parental behavior is not 'carved in stone' and labeling parents as good or bad (a view

sometimes encountered in self-help books on parenting) does not do justice to the dynamics of parental behavior (apart from having a stigmatizing effect on parents). In contrast, every parent seems to have the potential to be autonomy-supportive or to have the vulnerability to be psychologically-controlling.

In addition to individual differences and daily variation in socialization figures' style, there was significant variation at the family-level. Such family-level differences indicate that two different family members (i.e., two siblings) perceive the communication style of different socialization figures in a similar way. While such an effect is relatively easy to understand when it comes to mothers' and siblings' socialization style (because mothers and siblings are part of the same family), it is more surprising that there were also family-differences in perceived teacher autonomy support and psychological control. This effect indicates that siblings, who have different teachers, tend to perceive their teachers in similar ways. Although future research is needed to clarify this finding, we propose that perceiver effects could be a possible explanation. Indeed, previous research has shown that children and adolescents from one family have the tendency to perceive people in their social environment in a similar manner (e.g., Manders, Janssens, Cook, Oud, De Bruyn, & Scholte, 2009; Van der Kaap-Deeder et al., 2015). Additionally, through a process of observational learning, children may learn to apply the interactions observed within their family (e.g., between the parent and a child) in interactions with their sibling or teacher (Erel & Burman, 1995; Jenkins, Dunn, O'Connor, Rasbash, & Behnke, 2005).

The Unique Relations of Three Sources of Autonomy Support and Psychological Control with Child Outcomes

A second aim of this study was to examine whether autonomy support and psychological control from each social source (i.e., mothers, teachers, and siblings) would relate uniquely to, respectively, changes in need satisfaction and need frustration, and to, respectively, changes in well-being and ill-being. We found that the perceived socialization style from each social source had unique associations with children's psychological functioning. Even when considered simultaneously, the

effects of the different sources were not cancelled out. This study is the first to show the unique effects of especially sibling autonomy support, but also sibling psychological control above and beyond the effects of both parental and teacher autonomy support and psychological control. These results are in line with other studies showing the unique effects of autonomy support and psychological control experienced in horizontal relations (e.g., relations between peers or romantic partners) above and beyond the effects of autonomy support and psychological control experienced in vertical relations (e.g., parents, teachers, and coaches) on individuals' psychological functioning (Hagger et al., 2009; Ratelle, Simard, & Guay, 2013). Our findings are also in line with the increasing recognition of the important and unique role of siblings in children's psychosocial development (Conger et al., 1997; Kramer & Conger, 2009). Although siblings are recognized as an important source of influence on children's development, with an impact that can be either positive (Scholte et al., 2001) or negative (Buhrmester & Furman, 1990), relatively few studies to date examined the unique role of siblings over the role of other key socialization figures such as parents and teachers. This is particularly true with regard to the use of an autonomy-supportive and controlling interaction style. Overall, our findings testify to the unique importance of siblings for children's well-being as well as ill-being.

Our findings are also informative with respect to the current debate on the importance of the amount of time parents spend with their children. Milkie, Nomaguchi, and Denny (2015) found that the time mothers spent with their child (by being engaged with the child or simply by being present) was only moderately important for adolescents' delinquent behaviors and even unrelated to younger children's behavioral, emotional and academic functioning. However, as noted by Kalil and Mayer (2016), such findings do not say anything about the quality of these interactions. Indirectly, findings from the current study are in line with the notion that quality matters. Indeed, we found that the quality of the interactions with mothers (as indexed by high levels of autonomy support and low levels of psychological control) was uniquely important for elementary school children's well-being even though mothers generally spend less time with their child on schooldays than teachers.

Remarkably, the unique associations of each of the three sources of autonomy support and psychological control with the child outcomes were largely unaffected by dispositional levels of perceived autonomy support and psychological control assessed prior to the diary study. All children, even those who generally perceive their parents, teachers or siblings as low on autonomy support or high on psychological control, benefitted from daily experiences of autonomy support. At the same time, it appeared that all children suffer from daily experiences of psychological control. We further examined whether gender, age, and birth order moderated the relations in our models. The observed associations in our models were generally similar for boys and girls and for younger and older children or siblings.

Overall, the lack of moderation observed in this study underscores the strength and the robustness of the observed relations and is consistent with the SDT-based notion that the basic psychological needs play a universal role in associations between contextual influences and children's well-being (Deci & Ryan, 2000; Ryan et al., 2016). However, the robustness of our findings and the observation that each social source is uniquely related to children's well-being does not preclude the possibility that mothers, teachers, and siblings play a more differential role in more specific domains of children's lives. An important reason why we found that each social source mattered to a similar degree may be that we measured children's needs and well-being at a rather general level of abstraction (Vallerand, 1997). A different pattern of findings may emerge when assessing the needs and well-being in more specific domains, such as school, social relationships, and emotion regulation, or at specific moments (e.g., during or after school time). For instance, teacher autonomy support might be especially important for children's academic functioning (Guay et al., 2013). Further, although we did not find strong gender effects, the inclusion of domain-specific measures of well-being might shed more light on possible gender effects. For instance, Lietaert, Roorda, Laevers, Verschueren, and De Fraine (2015) showed that only boys (but not girls) benefitted from teacher autonomy support in terms of their level of behavioral engagement at school. Finally, future research tapping into needs experiences and well-

being several times during the day (e.g., using event sampling methodology) could determine whether, for instance, teacher autonomy support is especially beneficial for well-being during school time.

The Bright and Dark Pathways of Socialization Style

Consistent with recent theorizing (Bartholomew et al., 2011; Vansteenkiste & Ryan, 2013) regarding the distinct roles of need satisfaction and need frustration in, respectively, a 'bright' and 'dark' pathway of socialization, we found that autonomy support is related to higher well-being through satisfaction of the psychological needs and that psychological control related to more ill-being through frustration of the psychological needs. These findings suggest that the presence of social contexts that actively thwart children's needs (through psychological control) and that lead to need frustration cannot be equated with contexts that merely lack support of children's needs and that lead to low need satisfaction.

Although, in general, evidence was found in favor of these two pathways, two sets of findings need to be highlighted. First, daily perceived psychological control from both mothers and teachers continued to have a direct association with changes in daily ill-being even after controlling for daily need frustration. Therefore, need frustration does not seem to be the sole mechanism linking psychological control and ill-being. While we assessed need frustration as experienced at the general level, need frustration experienced specifically within the mother- or teacher-relationship might more fully mediate the relation between psychological control and ill-being than the currently assessed general need frustration. Additionally, it could be the case that need frustration is a rather distal mediator with another more proximal mediator intervening in the relation between need frustration and ill-being. In this respect, previous studies have shown a link between need satisfaction and well-being via either authenticity (Thomaes, Sedikides, Van den Bos, Hutteman, & Reijntjes, 2016) or mindfulness (Olafsen, 2016). Thus, future studies might focus on both distal and proximal mediators in the link between psychological control and ill-being. A third possibility is that part of the direct association between psychological control and ill-being reflects a child-driven effect (e.g., Belsky,

1984), where children who feel worse about themselves perceive parental and teacher behavior as more controlling and/or elicit more controlling reactions from these socialization figures.

A second finding that deserves being highlighted is that the daily experience of psychological control was related not only to feelings of ill-being, but also to diminished feelings of well-being. This finding is consistent with a presumed asymmetrical relation between autonomy support and psychological control on the one hand and well-being and ill-being on the other hand: whereas low perceived autonomy support does not necessarily engender ill-being, the presence of perceived psychological control does entail increased ill-being and reduced well-being (Vansteenkiste & Ryan, 2013).

Limitations

This study had several limitations. Although this study was the first to examine three social sources of autonomy support and psychological control simultaneously, there are several additional social sources that are important in children's lives. Studies have shown, for instance, that autonomy support from fathers also contributes to children's psychological well-being (e.g., Grolnick et al., 1991), albeit in somewhat different domains than mothers (e.g., Guay et al., 2013; Soenens & Vansteenkiste, 2005). Soenens and Vansteenkiste (2005), for example, found that whereas maternal autonomy support related to autonomous motivation for engaging in school work and friendship relationships among adolescents, paternal autonomy support related to autonomous motivation for job search. Furthermore, studies have shown that autonomy support from peers or friends contributed to beneficial outcomes, such as well-being (Ratelle, Simard, & Guay, 2013) and pro-social attitudes within sports (Ntoumanis et al., 2012). Future studies could also include these social figures.

Including multiple informants would also have additional methodological advantages such as the reduction of same-source bias, shared method variance and retrospective bias (although this problem is reduced in diary studies; Bolger, Davis, & Rafaeli, 2003). However, as previous studies have shown that especially child-reports are predictive of children's psychological functioning (Pettit et

al., 2001), we thought it was essential to first examine how children's perceptions of daily parenting relate to children's daily functioning. Nevertheless, there is a need for future studies to include multiple informants, for example by having siblings report both on the degree to which they receive and give autonomy support and psychological control towards each other and by having siblings report on the degree to which parents provide autonomy support and psychological control to both of them. Additionally, including multiple informants would also shed light on the important question to what extent the observed daily variation is only a function of the child's perception or whether, conversely, it reflects real variation in the socialization figures' actual behavior. As a number of recent studies have documented substantial daily variation in parenting practices, even when parents themselves reported on these practices (Aunola et al., 2013; Mabbe, Soenens, Vansteenkiste, Van der Kaap-Deeder, et al., 2016), it is unlikely, however, that daily variation in socialization figures' style is accounted fully by children's perception.

Further, we also noted rather low reliabilities for some of the study variables and in particular for the person-level autonomy support scales. Although these reliabilities are similar to previous studies among such a relatively young age group (e.g., Grolnick et al., 1991), effects of these measures should be interpreted with caution. As the day-level variables were, in general, more reliable than the person-level measures, diary methodology seems especially appropriate for such a relatively young age group. Indeed, because younger (relative to older) participants may experience more problems with memory bias and difficulty aggregating events across time and situations, a diary approach is particularly useful to arrive at more valid and reliable assessments in this age period. Moreover, as daily well-being and ill-being were assessed with rather homogeneous items (e.g., "I felt bad today" and "Today was a bad day"), future studies could further investigate children's psychological functioning with more differentiated items. Further, as we cannot be entirely confident that the children filled out the questionnaires at the requested time (i.e., in the evening instead of, for example, the next morning), future studies could employ electronic diaries. Additionally, although we found no effect of

birth order, our findings regarding birth order should be interpreted with some caution because we had no information about the siblings' exact place in the birth order in families with more than 2 children.[2] Finally, experimental designs could shed further light on the proposed causal link between the study variables, especially because child behavior has also been found to predict the quality of the mother-child relationship (e.g., Pastorelli et al., 2016).

Future Challenges

Given that the number of diary studies concerning autonomy support and psychological control is limited and given that this field is still in its infancy, a number of issues await being tested. We discuss four challenges that could be addressed. First, the finding that each of the three sources of autonomy support and psychological control have unique and rather stable associations with the child outcomes is remarkable because it suggests that autonomy support and psychological are characteristics of relationships that vary widely in terms of their general nature and developmental functions. We would like to note, however, that we do not argue that the way how autonomy support and psychological control manifest is identical, as this manifestation may depend on the type of relationship and on the birth order and absolute age of the children. While some features of autonomy support (e.g., acknowledging the other person's feelings) may apply similarly across types of relationships, other features (e.g., provision of a rationale for introducing a rule) are probably more or less relevant and prevalent depending on the type of relationship. As our study is among the first to examine these relationship characteristics across different types of relationships, we chose to rely on rather generic items for autonomy support and psychological control. A next step for future research is to gain more detailed insight in the manifestations of these dimensions in specific relationships. Observational studies and qualitative research may be particularly useful in this regard.

Second, this study only focused on autonomy-supportive or -suppressive practices. Future research needs to include other dimensions of socialization style that might contribute to daily need satisfaction and need frustration, including responsiveness/warmth and structure (Grolnick &

Pomerantz, 2009; Soenens & Vansteenkiste, 2010). Such research could address the complex interplay between different dimensions of socialization style, including the question whether certain features of socialization style are relatively more relevant to specific individual psychological needs (e.g., with autonomy support being more relevant to the need for autonomy and with responsiveness being more relevant to the need for relatedness).

Third, this study was conducted in a country (Belgium) with a cultural orientation characterized by fairly high levels of independence and individualism (Hofstede, Hofstede, & Minkov, 2010). Previous research comparing Belgium with other, more collectivistic, countries (e.g., China and South-Korea) found that the effects of perceived parental autonomy support and psychological control on adolescents' psychological functioning was fairly similar across countries (e.g., Fousiani, Van Petegem, Soenens, Vansteenkiste, & Chen, 2014; Soenens, Park, Vansteenkiste, & Mouratidis, 2012). These findings are in line with Self Determination Theory's universality claim (Deci & Ryan, 2000), which states that autonomy support and psychological control are, respectively, beneficial and detrimental for all individuals, regardless of one's cultural background. However, the way children interpret and cope with parenting practices can be influenced by cultural orientation (see also Soenens, Vansteenkiste, & Van Petegem, 2015 for a discussion on this issue). Future diary studies may provide another look at cross-cultural differences and similarities, for instance by addressing the question whether -- in addition to mean-level differences between cultures -- there are between-culture differences in the degree of daily variation in the provision of autonomy support and psychological control. Also, cultural orientation might affect to some extent associations of daily autonomy support and control with children's well-being. For instance, stronger endorsement of collectivism may somewhat attenuate associations between daily psychologically controlling socialization and ill-being because children with more collectivistic values have a relatively more benign attribution of psychologically controlling events (Gershoff et al., 2010).

Fourth, given that daily variations in socialization figures' perceived autonomy support and psychological control seem to matter for children's well-being, an important direction for future research is to examine the origins of those daily variations. Possibly, socialization figures' own basic psychological need satisfaction plays a role. De Haan, Soenens, Prinzie, and Dekovic (2013) recently showed that parents who experienced low need satisfaction were more likely to engage in psychologically controlling parenting, possibly because they lack the energy necessary to adopt a more autonomy-supportive style. Ultimately it would be interesting for future research to assess the psychological needs and the communication styles in both the socialization figures and the children simultaneously. Such a study would allow one to examine not only the degree of convergence in different reporters' perception of communication style but also to examine whether the socialization figures' psychological need experiences transfer to the child's experiences through the figures' communication style. Such research would also allow one to examine reciprocal processes: children's well-being and adjustment may in itself represent a source of need satisfaction for parents and teachers. In contrast, ill-being and problem behavior are likely to increase experiences of need frustration in socialization figures and to elicit a more controlling style. Thus, diary studies including different informants is needed to draw a fuller picture of the complex and bidirectional dynamics involved in daily effects of socialization.

Conclusion

This study showed that daily fluctuations in autonomy support and psychological control from three important social sources (i.e., mothers, teachers, and siblings) are related to changes in daily fluctuations in children's well-being and ill-being through, respectively, changes in the daily satisfaction and frustration of children's basic psychological needs. These findings point to (a) the importance of mothers, teachers, and siblings in the daily well-being of elementary school-aged children; (b) the relevance of investigating daily processes of autonomy support and psychological control in relationships with different developmental functions; and (c) the differentiation between a

bright (i.e., autonomy support – need satisfaction – well-being) and dark (i.e., psychological control – need frustration – ill-being) pathway in socialization.

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Autonomy-supportive Parenting and Autonomy-supportive Sibling Interactions: The Role of Mothers' and Siblings' Psychological Need Satisfaction[1]

Autonomy-supportive parenting yields manifold benefits. To gain more insight into the family-level dynamics involved in autonomy-supportive parenting, the present study addressed three issues. First, on the basis of Self-Determination Theory, we examined whether mothers' satisfaction of the psychological needs for autonomy, competence, and relatedness related to autonomy-supportive parenting. Second, we investigated maternal autonomy support as an intervening variable in the mother–child similarity in psychological need satisfaction. Third, we examined associations between autonomy-supportive parenting and autonomy-supportive sibling interactions. Participants were 154 mothers (*M*age = 39.45, *SD* = 3.96) and their two elementary school-age children (*M*age = 8.54, *SD* = 0.89 and *M*age = 10.38, *SD* = 0.87). Although mothers' psychological need satisfaction related only to maternal autonomy support in the younger siblings, autonomy-supportive parenting related to psychological need satisfaction in both siblings and to an autonomy-supportive interaction style between siblings. We discuss the importance of maternal autonomy support for family-level dynamics.

[1] Van der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., Loeys, T., Mabbe, E., & Gargurevich, R. (2015). Autonomy-supportive parenting and autonomy-supportive sibling interactions: The role of mothers' and siblings' psychological need satisfaction. *Personality and Social Psychology Bulletin, 41*, 1590-1604. doi: 10.1177/0146167215602225

Introduction

Key to children's development is parents' support of autonomy, such that children engage in daily activities with a sense of willingness and volition rather than out of obligation and pressure (Ryan, Deci, Grolnick, & La Guardia, 2006). Various scholars have highlighted the importance of autonomy for children's development (e.g., Nucci, 2013; Smetana & Asquith, 1994). One theory in which the concept of autonomy support takes a prominent place is Self-Determination Theory (SDT), a broad theory on human motivation and socialization (Deci & Ryan, 2000; Vansteenkiste, Niemiec, & Soenens, 2010). SDT states that autonomy support plays a key role in children's development because it provides the crucial nutrients for growth in the form of satisfaction of the psychological needs for autonomy, competence, and relatedness.

Multiple studies within the SDT-tradition and beyond have indicated that parental autonomy support is crucial for children's well-being, emotion regulation skills, and adaptive social and cognitive development (Bernier, Carlson, & Whipple, 2010; Grolnick, Ryan, & Deci, 1991; Joussemet, Landry, & Koestner, 2008). Yet, few studies have shed light on the origins of autonomy-supportive parenting (e.g., Grolnick & Apostoleris, 2002). In the present research, we examined whether mothers' experiences of psychological need satisfaction would relate to an autonomy-supportive child-rearing style and whether autonomy support would, in turn, relate to children's psychological need satisfaction. Also, research on autonomy support in families has tended to focus on one specific dyad (most often the parent-child dyad) without examining the interplay between different dyads in the family. As such, to the best of our knowledge, research has not yet examined whether maternal autonomy support is related to the way siblings interact with each other. This is unfortunate because in middle childhood sibling relationships take a prominent role and substantially affect children's psychosocial adjustment (Gass, Jenkins, & Dunn, 2007). This study addresses the question whether maternal autonomy support

is related positively to mutual autonomy support among siblings and whether siblings' psychological need satisfaction plays an intervening role in this relation.

Parental Autonomy Support and Children's Psychological Need Satisfaction

In SDT, autonomy-supportive parenting is defined as parents' promotion of volitional functioning in children (e.g., Grolnick et al., 1991; Ryan et al., 2006). A key characteristic of parental autonomy support is parents' capacity to adopt and accept the frame of reference of their children. When doing so, parents are capable of providing the desired amount of choice to their children, to stimulate their children to take initiative thereby following children's pace of development, and to provide rationales for requests that are personally meaningful to their children (Grolnick et al., 1991; Joussemet, Landry, & Koestner, 2008; Soenens & Vansteenkiste, 2010). In contrast, autonomy-suppressing parenting involves being controlling. Controlling parents minimize, ignore, or deny the child's perspective, thereby imposing their own viewpoint by making use of a variety of pressuring strategies (Grolnick & Pomerantz, 2009), such as guilt induction, love withdrawal, verbal hostility, and physical punishment (Soenens & Vansteenkiste, 2010).

Within SDT, it is stated that parental autonomy support contributes to optimal psychosocial development through the satisfaction of children's psychological needs (Grolnick et al., 1991; Joussemet, Landry, & Koestner, 2008). SDT postulates three needs, that is, the needs for autonomy, competence, and relatedness (Deci & Ryan, 2000; Vansteenkiste et al., 2010). The need for autonomy concerns experiencing a sense of volition and self-endorsement when carrying out an activity. Satisfaction of this need is apparent, for example, when children do chores in the house willingly or when they are offered the opportunity to express irritation or sadness vis-à-vis the parents. The need for competence entails the experience of mastery in executing daily activities and effective coping with challenges. This need is satisfied, for example, when children feel proficient when doing homework or when they feel capable of developing their music skills. Finally, the need for relatedness signifies

having warm and trusting relationships. The need for relatedness is satisfied when children feel connected with their parents and experience a sense of authentic care.

The satisfaction of these psychological needs relates positively to a variety of beneficial outcomes (for an overview, see Deci & Ryan, 2000). Although previous research found such relations systematically in adult samples (e.g., Van den Broeck, Vansteenkiste, Lens, De Witte, & Soenens, 2010), the number of studies involving elementary school children, the population targeted in the present research, is more limited. Veronneau, Koestner, and Abela (2005) showed that third to seventh graders' overall need satisfaction yielded a concurrent positive relation to a composite score of wellbeing. Sebire, Jago, Fox, Edwards, and Thompson (2013) found in a cross-sectional study that need satisfaction in 7- to 11-year-old children related positively to greater enjoyment of physical activity.

Furthermore, consistent with theorizing, parental autonomy support was found to relate to need satisfaction in children and adolescents between 9 and 20 years old (Sheldon, Abad, & Omoile, 2009). Moreover, studies among elementary school-age children showed that parental autonomy support is related to beneficial outcomes such as school performance (Grolnick et al., 1991), interest in mathematics (Aunola, Viljaranta, Lehtinen, & Nurmi, 2013), and autonomous motivation for engaging in physical activity (Vierling, Standage, & Treasure, 2007). Need satisfaction was found to account for many of these associations (e.g., Grolnick et al., 1991). In contrast, autonomy-suppressing (i.e., controlling) parenting was found to relate to adolescent ill-being and problem behaviors via reduced need satisfaction (Ahmad, Vansteenkiste, & Soenens, 2013; Mabbe, Soenens, Vansteenkiste, & Van Leeuwen 2015).

Parents' Own Psychological Need Satisfaction and Parental Autonomy Support

Given the benefits associated with autonomy-supportive, relative to more controlling, parenting, the present study aimed to examine whether parental psychological need satisfaction

represents a critical resource for parents (mothers) to be autonomy-supportive. That is, processes of need satisfaction would help not only to explain why autonomy-supportive parenting is related to outcomes in children but also to predict why some parents are more autonomy-supportive than others. We reasoned that when parents experience in general a sense of psychological freedom and volition (i.e., autonomy satisfaction), feel able to effectively engage in daily activities (i.e., competence satisfaction), and feel related to other persons (i.e., relatedness satisfaction), they are likely to have more energy available. Energy is defined herein as the feeling of vitality and being alive (Ryan & Frederick, 1997). Such elevated energy would then manifest more specifically via enhanced receptivity toward the child (Hodgins, Koestner, & Duncan, 1996) and psychological availability to be attuned to the child's viewpoint (Danner-Vlaardingerbroek, Kluwer, Van Steenbergen, & Van der Lippe, 2013). These resources are probably key to provide meaningful choices, to encourage initiative, and to constructively handle child resistance through dialogue. Instead, the frustration of these needs would generally reduce parents' level of energy. This, in turn, would prompt a more self-centered and defensive attitude (Hodgins et al., 1996), such that parents would more easily impose their own expectations on their children in a pressuring way.

Several strands of work have provided indirect evidence for this reasoning. First, the energy-boosting effects of need satisfaction and the energy-depleting effects of need frustration have been documented extensively (for an overview, see Ryan & Deci, 2008). For example, daily fluctuations in the satisfaction of the need for autonomy and competence related positively to daily fluctuations in vitality (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), whereas need frustration related to emotional exhaustion (Vander Elst, Van den Broeck, De Witte, & De Cuyper, 2012). In addition, energy was found to be crucial for parenting as it was associated positively with parental self-efficacy and with feelings of satisfaction with one's parenting (Janisse, Barnett, & Nies, 2009).

Furthermore, a number of studies found that context-specific need satisfaction is related positively to an autonomy-supportive socialization style within that context. For instance, coaches' need satisfaction in the context of sport is related positively to coaches' autonomy support toward athletes (e.g., Stebbings, Taylor, Spray, & Ntoumanis, 2012) and teachers' need satisfaction in the context of school is related positively to the provision of autonomy toward students (e.g., Van den Berghe et al., 2014). Similar evidence for an association between parental need satisfaction and autonomy-supportive parenting is indirect at best. In one relevant study, de Haan, Soenens, Dekovic, and Prinzie (2013) showed that indirect measures of parental need satisfaction, as reported by the parents, related negatively to autonomy-suppressing (i.e., overreactive or controlling) parenting, as reported by early and middle adolescents.

We must note, however, that in each of these previous studies, need satisfaction and autonomy-supportive socialization were assessed within the same context. In contrast, this study investigated whether need satisfaction as experienced by mothers in general (i.e., across contexts) would spill over to their provision of autonomy support in one specific relation, that is, the mother-child relationship. According to the ecological perspective on child development (Bronfenbrenner, 1986), the parent-child relationship is influenced by parents' experiences in other contexts (e.g., work). Consistent with this argument, Danner-Vlaardingerbroek et al. (2013) found that parents who had a bad day at work had more negative interactions with their child after that workday, whereas a good day at work fostered a more positive parent‑child interaction.

Autonomy-supportive Interactions Among Siblings

Research has demonstrated convincingly the relational benefits of maternal autonomy support *outside* the family, with children of autonomy-supportive parents, for instance, reporting higher social competence (e.g., Soenens & Vansteenkiste, 2005) and less physical aggression toward peers (e.g., Joussemet, Vitaro, et al., 2008). In the present study, we examined whether similar benefits of maternal

autonomy support would emerge *within* the family, that is, in sibling relationships. This is an important issue because sibling relationships are a critical predictor of children's adjustment, in particular during middle childhood and adolescence (Furman & Buhrmester, 1992). Research in middle childhood and adolescence has shown that the way siblings interact with each other relates to their psychological functioning. For example, autonomy-suppressive sibling interactions are related to adjustment problems, reduced self-confidence (Conger, Conger, & Scaramella, 1997), as well as to anxiety and depressive symptoms (Campione-Barr, Lindell, Greer, & Rose, 2014).

Herein, we aimed to investigate whether an autonomy-supportive parenting style would relate to an autonomy-supportive interaction style between siblings. To the best of our knowledge, this question has not been investigated previously. Yet, previous studies have shown that the quality of the parent-child relationship and the quality of the sibling relationship are related (e.g., Brody, Stoneman, & McCoy, 1994; McHale, Whiteman, Kim, & Crouter, 2007). For example, in a sample of parents and their 8- to 12-year-old children, Hakvoort, Bos, Van Balen, and Hermanns (2010) found that parent-child relationships characterized by warmth and low levels of conflict were associated with more affectionate and less conflictual sibling relationships. A study among adolescents showed that an autonomy-suppressive (i.e., psychologically controlling) parenting style was associated with a similar autonomy-suppressive interaction style between siblings (Conger et al., 1997).

In addition to investigating the relation between an autonomy-supportive parenting style and autonomy-supportive sibling interactions, we also investigated the possible mechanism behind this association. We propose that need satisfaction plays an important intervening role. Similar to the reasoning with regard to parental need satisfaction, we hypothesize that children who experience more need satisfaction (due to experiencing more maternal autonomy support) have more energy available to engage in an autonomy-supportive interaction style vis-a-vis their sibling.

The present study focused on middle childhood (i.e., the life period beginning around age 7 or 8 until about the age of 12) because sibling interactions in this period are numerous and of a high intensity. Indeed, in this developmental period, children spend most of their free time with their siblings (Bank & Kahn, 1982; McHale & Crouter, 1996). Furthermore, Buhrmester and Furman (1990) showed that sibling relationships in this period are highly intense as indicated by both more experienced closeness and more conflict between siblings compared with sibling relationships during adolescence. Therefore, it seems particularly important to examine a possible spillover from maternal to sibling autonomy support during this developmental period.

The Present Study

This study had three important aims, which we investigated in a sample of mothers and their two elementary school-age children. A first aim was to examine whether mothers' psychological need satisfaction would relate to their use of an autonomy-supportive interaction style. On the basis of the argument that need satisfaction provides mothers with energy and important resources, we expected that maternal psychological need satisfaction would relate positively to child-perceived autonomy support (Hypothesis 1). To examine whether mothers' overall adjustment would serve as a confounding variable accounting for the contribution of mothers' need satisfaction to autonomy support, we controlled for maternal differences in self-esteem. To illustrate, a mother who feels valuable may experience both more need satisfaction and be perceived as providing more autonomy support, such that maternal self-esteem accounts for the association between maternal need satisfaction and autonomy support.

Second, given that we expected that maternal autonomy support would relate to psychological need satisfaction in the child, we also examined whether maternal autonomy support would represent an intervening variable in the intergenerational similarity in mothers' and children's psychological need

satisfaction. We anticipated that maternal need satisfaction would be related to children's need satisfaction through mothers' adoption of an autonomy-supportive style (Hypothesis 2).

A third aim was to investigate whether maternal autonomy support would relate to autonomy support in sibling relationships through children's psychological need satisfaction. Indeed, children's experiences of psychological need satisfaction (as fostered by maternal autonomy support) may allow the children to engage in more autonomy-supportive interactions with their siblings. Thus, we hypothesized that perceived maternal autonomy support would spill over to sibling autonomy support via siblings' experiences of need satisfaction (Hypothesis 3). The full hypothesized model is displayed graphically in Figure 1.

Method

Participants and Procedure

Participants were mothers (N = 154, Mage = 39.45, SD = 3.96) and two of their children (N = 308). Of these two children, the younger siblings were on average 8.54 years old (SD = 0.89), and the older siblings were on average 10.38 years old (SD = 0.87). All children attended elementary school. Of the children, 55% were female. The distribution of gender did not differ between the younger and older participants: 53% girls in the younger group and 56% girls in the older group, $\chi^2(1) = .21$, $p = .65$. In most families, there were two (49%) or three (33%) children. The majority of mothers followed higher education (78%) and were married (85%).

Families were recruited as part of an undergraduate course in developmental psychology in which students were asked to invite two families (who were not relatives or close friends of the student) with at least two elementary school children between 8 and 12 years old. If a family had more than two children between 8 and 12 years old, we informed students to select those two children who were closest to each other with respect to their age. Furthermore, we trained students to approach

potentially interested families and to assist the children in filling out the questionnaires. Students also asked mothers to remind their children to fill out the diary questionnaires (see below) each day. Participation was voluntary, and confidentiality was guaranteed. Mothers gave their written consent on behalf of themselves and their children.

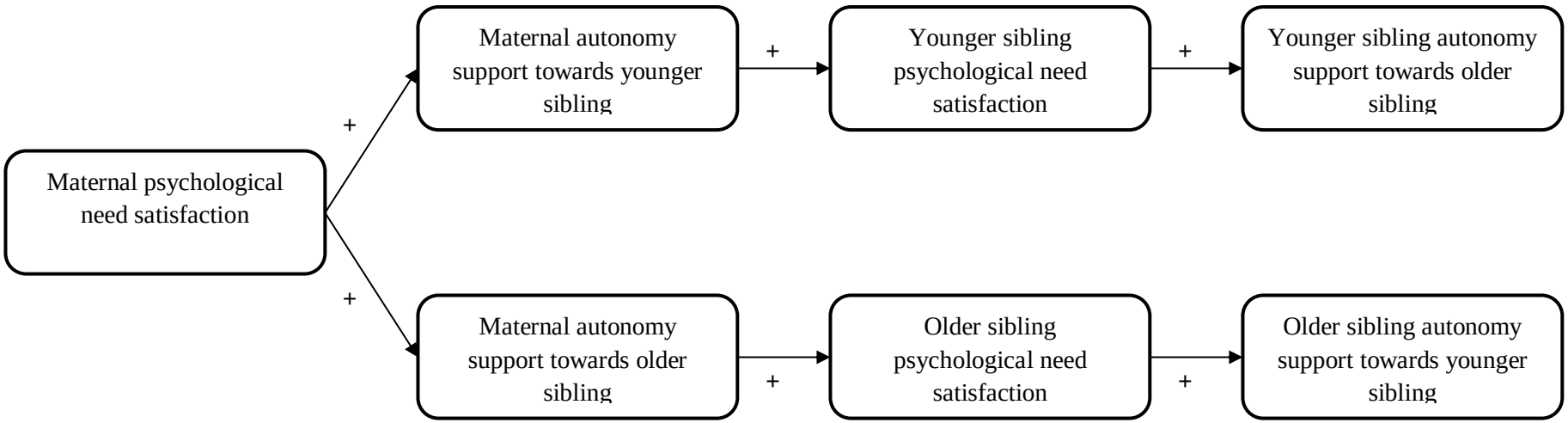

Figure 1. The Hypothesized Model based on Self-Determination Theory.

Students administered questionnaires via a home visit and a diary. During the home visit, children filled out a questionnaire assessing perceived maternal autonomy support and both mothers and children filled out a questionnaire concerning psychological need satisfaction. We had two reasons to include a measure of child-perceived autonomy support. First, the association between mothers' need satisfaction and maternal reports of provided autonomy support could be driven by shared method variance, a problem that can be overcome by relying on different reporters (i.e., maternal report of need satisfaction and child reports of autonomy support). Second, previous research showed that the association between parental and child reports of parenting is rather modest (e.g., Schwarz, Barton-Henry, & Pruzinsky, 1985), with especially child perceptions of parenting relating to child outcomes.

Children were also provided with a diary booklet, tapping into daily sibling autonomy support, which they filled out once a day during five consecutive schooldays. Specifically, we asked each sibling to report daily on the degree to which she or he received autonomy support from the other sibling (of which an average score across all days was created), which yielded an important methodological advantage. When examining the association between the degree to which each sibling experienced need satisfaction and provided autonomy support, we used the younger sibling's report of need satisfaction and the older sibling's report of the degree to which she or he received autonomy support from the younger sibling (and vice versa). In doing so, we avoided the problem of shared method variance. In addition, an important advantage of the used diary methodology is that it reduces recall bias (Laurenceau & Bolger, 2005) and, as such, may provide a more veridical picture of the degree to which siblings support each other's autonomy.

Measures

Psychological need satisfaction. Both mothers and children filled out the Basic Psychological Need Satisfaction and Need Frustration Scale (BPNSNF; Chen et al., 2015). This 24-item questionnaire measures the satisfaction (4 items per need) as well as the frustration (4 items per need) of the three

psychological needs. We slightly simplified the items of this questionnaire in the child version as to fit the age of the participants. Example items from the child version are "I feel a sense of freedom in the things I do" (i.e., autonomy satisfaction), "I feel forced to do many things I actually don't want to do" (i.e., autonomy frustration), "I feel confident that I can do things well" (i.e., competence satisfaction), "I have serious doubts about whether I can do things well" (i.e., competence frustration), "I feel close to other people I care about" (i.e., relatedness satisfaction), and "I feel that people who are important to me are unfriendly to me" (i.e., relatedness frustration). We reverse scored the 12 items assessing need frustration and averaged these with the 12 items assessing need satisfaction to obtain an aggregate score of need satisfaction versus frustration, as has been done in previous research (e.g., Baard, Deci, & Ryan, 2004). For ease of presentation, we will refer to this score as a score for need satisfaction. The scale was reliable both for mothers (α = .89) and children (α = .76 for the younger children and α = .84 for the older children).

Maternal autonomy support. Children were administered a seven-item Dutch version (Vansteenkiste, Zhou, Lens, & Soenens, 2005) of the Autonomy Support Scale of the Perceptions of Parents Scale (POPS; Grolnick et al., 1991; for example, "My mother, whenever possible, allows me to choose what to do"). This scale contains only two items tapping into autonomy-suppressing (controlling) parenting. To better capture the autonomy-suppressing pole of this parenting dimension, participants also filled out a Dutch version (Soenens, Vansteenkiste, Luyckx, & Goossens, 2006) of the eight-item Psychological Control Scale-Youth Self-Report (PCS-YSR; Barber, 1996). An example item is "My mother is less friendly with me if I do not see things her way." Items from both scales were slightly simplified to make them appropriate and readable for elementary school children. As in previous studies (e.g., Kins, Beyers, Soenens, & Vansteenkiste, 2009; Soenens & Vansteenkiste, 2005), we reverse scored items for psychological control and averaged these with items for autonomy support to obtain an aggregate score of perceived maternal autonomy support versus control. For ease of

presentation, we will refer to this score simply as a score for perceived maternal autonomy support. This scale was reliable (α = .77 for the younger children and α = .74 for the older children).

Sibling autonomy support. Autonomy support from the sibling, as experienced by the children, was assessed daily during 5 days by means of a shortened and slightly adjusted version of the maternal autonomy support scale discussed in the previous paragraph. For this purpose, we replaced references to "my mother" with "my brother or sister" and adapted the items to assess daily autonomy support. In addition, we selected those items of the maternal autonomy support scale that were most suitable for daily assessments of autonomy support as well as for the sibling relationship. In this way, we ended up with four items for autonomy support (e.g., "Today, whenever possible, my brother or sister allowed me to choose what to do") and four items for psychological control (e.g., "Today my brother or sister was less friendly with me if I did not see things his or her way"). All eight items were averaged across the 5 days. As with the scale for maternal autonomy support, we reverse scored items tapping into psychological control and averaged these with the autonomy support items. This scale was reliable (α = .81 for the younger children and α = .88 for the older children). The response rate across these 5 days was high as only one child did not fill out the diary questionnaires each day.

Mothers' level of self-esteem. We included the Dutch version (Franck, De Raedt, Barbez, & Rosseel, 2008) of the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1979) to assess self-esteem in mothers. This scale consists of 10 items (e.g., "On the whole, I am satisfied with myself") that were rated on a scale ranging from 0 (*strongly disagree*) to 3 (*strongly agree*). This scale was reliable (α = .86).

Plan of Analyses

To address our research aims, path models (with manifest variables) were tested using the lavaan package (Rosseel, 2012) of the R system for statistical analyses (Version 2.15.2; R Development Core Team, 2012), with estimation based on robust maximum likelihood. We employed

several indices to evaluate the model fit of these models, namely, the comparative fit index (CFI), the χ^2 test, the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA). An acceptable fit was indicated by CFI values of .90 or above, χ^2/df ratio of 2 or below, and SRMR and RMSEA values of around .08 or below (Hu & Bentler, 1999; Kline, 2005).

In total, we tested four different path models. In all models, we controlled for age and gender of the children. In a first model, we tested whether mothers' need satisfaction would relate to maternal autonomy support as perceived by the children. In a second model, we investigated the relation between mothers' and children's need satisfaction. In a third model we examined the mediating role of maternal autonomy support in the relation between mothers' and children's need satisfaction. In a fourth and final model, sibling autonomy support was added to the model, with mothers' and children's need satisfaction and maternal autonomy support as its predictors. In this final model, we also controlled for perceiver effects (Kenny, 1994). Specifically, there might be a tendency for children to perceive their mother and their sibling as similarly autonomy-supportive. To control for this perceiver tendency, we allowed a path between perceived maternal autonomy support and perceived sibling autonomy support. In all models, we allowed measures of both siblings to be correlated (e.g., need satisfaction of the younger siblings was allowed to be correlated with need satisfaction of the older siblings), as to account for the interdependence in the data (i.e., children from one family are expected to be more similar to one another than children from two different families). Unstandardized paths coefficients and their standard errors are reported in the text and figures. In total, there were 0.65% cases with missing values in the data. By default, the R statistical system treated these cases as structurally missing (i.e., complete case analysis).

To examine whether the associations in these four models would be similar for the two siblings, we performed a multigroup comparison, thereby comparing unconstrained, partially constrained, and fully constrained models. In this way, we could determine whether the relations between the constructs

in our model were equally strong for both siblings (e.g., "Is mothers' need satisfaction associated with children's need satisfaction to the same degree in younger and older siblings?"). In the unconstrained model, all path coefficients were allowed to be freely estimated between the siblings. In other words, relations in the models were allowed to be different for younger and older siblings. In contrast, in the constrained model, all path coefficients were constrained to be equal for both siblings, thus testing the assumption that the relations were equally strong for both siblings. In the partially constrained models, we gradually constrained path coefficients so that some were constrained to be equal for both siblings and other path coefficients were estimated freely. To decide which of these models fitted the data best, chi-square difference tests were performed. If the fit of the more complex model was significantly better, we reported that model. If models fitted equally well, we reported the more parsimonious model, that is, with (partially) constrained paths.

Results

Descriptive Statistics and Preliminary Analyses

Bivariate correlations between the study variables can be found in Table 1. Mothers' need satisfaction related to maternal autonomy support experienced by the younger but not the older children. Furthermore, mothers' need satisfaction related positively to children's need satisfaction although the association with need satisfaction in the older children was only marginally significant. Perceived maternal autonomy support was related to need satisfaction in both children. Finally, perceived sibling autonomy support, as reported by both the youngest and the oldest child, related positively to mothers' need satisfaction, to children's and siblings' need satisfaction, and to maternal autonomy support according to both children.

Table 1

Descriptives and Correlations between the Study Variables

	1	2	3	4	5	6	7
1. Psychological need satisfaction (M)	_						
2. Psychological need satisfaction (Y)	.24**	_					
3. Psychological need satisfaction (O)	.14†	.21*	_				
4. Perceived maternal autonomy support (Y)	.27**	.44***	.13	_			
5. Perceived maternal autonomy support (O)	.10	.23**	.34***	.30***	_		
6. Perceived sibling autonomy support (O)	.23**	.21**	.26**	.30***	.38***	_	
7. Perceived sibling autonomy support (Y)	.24**	.34***	.27**	.50***	.20*	.38***	_
M	2.36	3.89	3.97	3.67	3.92	3.79	3.69
SD	.91	.45	.48	.62	.51	.78	.70

Note. M = Mother report; Y = Younger child report; O = Older child report. †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

We also performed paired-samples *t*-tests to compare the means of need satisfaction, maternal autonomy support, and sibling autonomy support between the younger and older children. As can be seen in Table 1, older children reported receiving more autonomy support from their mothers, $t(153) = -4.66$, $p < .01$, and siblings, $t(152) = 8.44$, $p < .01$, and there was a marginally significant trend for them to report more need satisfaction than their younger siblings, $t(153) = -1.79$, $p < .10$.

Correlational analyses indicated that maternal age and age of the younger siblings were not associated with the study variables. Age of the older siblings did correlate positively with mothers' need satisfaction ($r = .16$, $p < .05$) and with maternal autonomy support as perceived by the older siblings ($r = .29$, $p < .01$). Furthermore, we conducted independent-samples *t*-tests to examine effects of family structure (intact or not intact) and gender. No significant effects were found, except for a significant gender difference in older siblings' need satisfaction, with boys reporting more need satisfaction ($M = 4.11$, $SD = 0.41$) than girls ($M = 3.86$, $SD = 0.50$), $t(152) = -3.40$, $p < .01$. Finally, a one-way analysis of variance indicated that maternal educational level was unrelated to the study variables.

Primary Analyses

Hypothesis 1: Relation between Mothers' Psychological Need Satisfaction and Maternal Autonomy Support. Fit indices of all structural models can be found in Table 2. In the first structural model, we examined whether mothers' need satisfaction would relate to perceived maternal autonomy support. The fit of the unconstrained model was significantly better than the fit of the constrained model (see Table 2). Mothers' need satisfaction related positively to maternal autonomy support as reported by the younger sibling, $B = .17$ ($SE = .06$), $p < .01$; 95% confidence interval [CI] = [0.06, 0.28], but not to maternal autonomy support as reported by the older sibling, $B = .03$ ($SE = .04$), $p > .05$; 95% CI [-0.04, 0.11]. In addition, reports of maternal autonomy support provided by both siblings were positively correlated after accounting for mothers' need satisfaction ($r = .27$, $p < .01$).

Table 2

Fit Indices of All Tested Models

Model	χ^2 /*df*	CFI	SRMR	RMSEA	χ^2 difference (*df*; model comparison)
1 Mothers' need satisfaction and autonomy support					
a. Unconstrained model	1.35	.98	.02	.05	
b. Constrained model	3.26	.82	.05	.12	7.02** (1; a vs. b)
2 Mothers' and children's need satisfaction					
a. Unconstrained model	.39	1.00	.02	.00	
b. Constrained model	.60	1.00	.02	.00	1.03 (1; a vs. b)
3 Maternal autonomy support as a mediator					
a. Unconstrained model	.82	1.00	.04	.00	
b. Constrained model	1.08	.98	.05	.02	7.08* (2; a vs. b)
c. Partially constrained model	.79	1.00	.04	.00	.22 (1; a vs. c)
4 Children's need satisfaction and sibling autonomy support					
a. Unconstrained model	1.01	1.00	.05	.01	
b. Constrained model	1.08	.99	.05	.02	7.71 (5; a vs. b)
c. Partially constrained model	.95	1.00	.05	.00	6.58* (1; b vs. c)

Note. CFI = Comparative fit index; SRMR = Standardized root mean square residual; RMSEA = Root mean square error of approximation.

*$p < .05$; **$p < .01$.

Hypothesis 2: Maternal Autonomy Support as an Intervening Variable in the Mother-Child Similarity in Psychological Need Satisfaction. In the second model, we examined whether mothers' need satisfaction would relate to children's need satisfaction. The fit of the unconstrained model was similar to the fit of the constrained model (see Table 2), showing that this association did not differ between younger and older siblings. Specifically, mothers' need satisfaction related positively to both children's need satisfaction, B = .09 (SE = .03), p < 01; 95% CI [0.04, 0.15]. Furthermore, there was a marginally significant residual association between both siblings' reports of need satisfaction (r = .18, p < .10).

The third model was a mediation model with perceived maternal autonomy support playing an intervening role in the relation between mothers' need satisfaction and children's need satisfaction. We also added a direct path from mothers' need satisfaction to children's need satisfaction to the model, but this path was dropped again due to being nonsignificant. The fit of the unconstrained model was not significantly better than the fit of the constrained model (see Table 2), indicating that the associations in this model were similar for both siblings. However, given the results obtained with Model 1, we also tested a partially constrained model in which the first part of the model (i.e., the path from mothers' need satisfaction to maternal autonomy support) was unconstrained while the second part of the model (i.e., the path from maternal autonomy support to children's need satisfaction) was constrained. This partially constrained model yielded a better fit to the data than the fully constrained model. This model is displayed graphically in Figure 2.

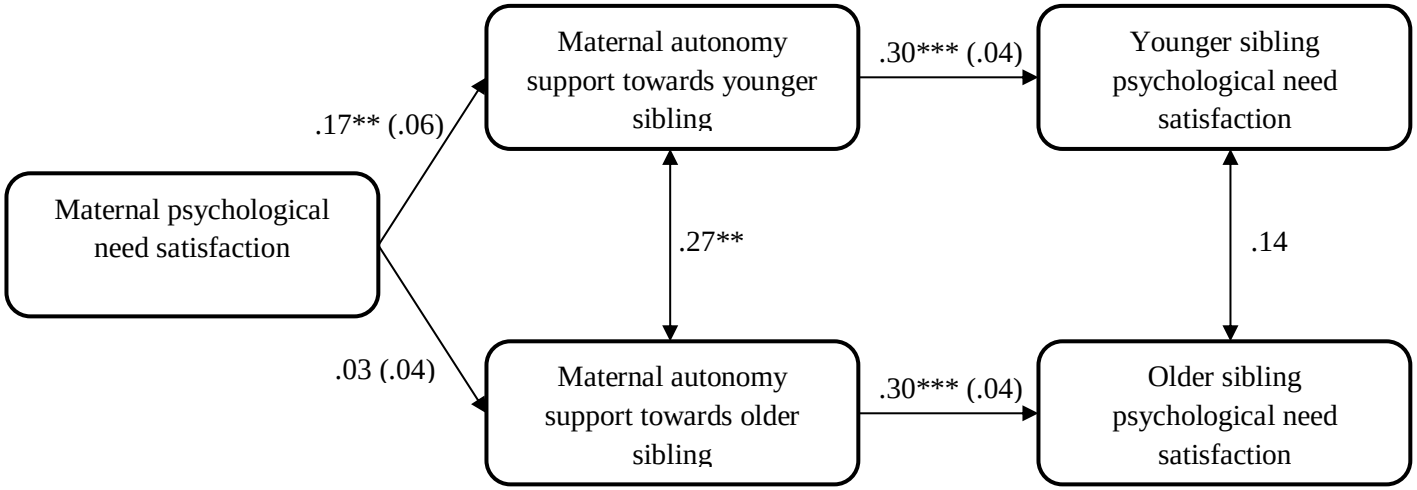

Figure 2. Structural Model Depicting the Relation between Mothers' Psychological Need Satisfaction, Perceived Maternal Autonomy Support, and Children's Psychological Need Satisfaction.

Coefficients shown are unstandardized path coefficients with standard errors reported between brackets. Correlations between siblings on the same variables are also shown.

**$p < .01$. ***$p < .001$.

Among the younger children, mothers' need satisfaction related positively to perceived maternal autonomy support, which, in turn, related to children's need satisfaction. This indirect effect was significant, $B = .05$ ($SE = .02$), $p < .01$; 95% CI [0.01, 0.09]. In contrast, among the older children, mothers' need satisfaction did not relate to maternal autonomy support. Maternal autonomy support did relate positively to children's need satisfaction. Thus, although mothers' need satisfaction only related to perceived maternal autonomy support in the younger children, experiencing maternal autonomy support was related to need satisfaction in both younger and older children.

Hypothesis 3: Associations between Maternal Autonomy Support and Sibling Autonomy Support. In Model 4, we added sibling autonomy support as an outcome to Model 3. The overall constrained model fitted the data equally well as the unconstrained model (see Table 2). We also tested several partially constrained models in which different parts of the model were held equal between the siblings. Only one partially constrained model yielded a better fit than the fully constrained model. This model is displayed graphically in Figure 3. In this model, all paths were constrained, except for the path from mothers' need satisfaction to maternal autonomy support, which was allowed to be estimated freely between the two siblings.

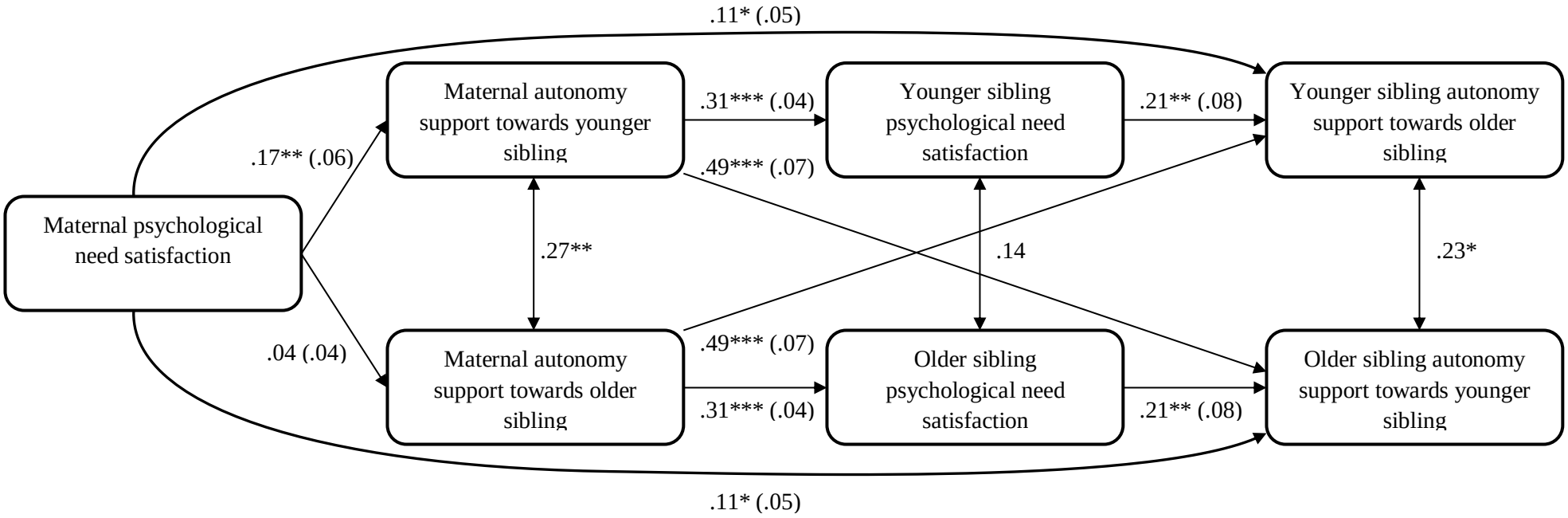

Figure 3. Structural Model Depicting the Relation between Mothers' Psychological Need Satisfaction, Perceived Maternal Autonomy Support, Children's Psychological Need Satisfaction and Sibling Autonomy Support.

Coefficients shown are unstandardized path coefficients with standard errors reported between brackets. Correlations between siblings on the same variables are also shown.

*p < .05. **p < .01. ***p < .001.

In line with the previous models, mothers' need satisfaction positively predicted maternal autonomy support in the younger children (but not in the older children) and maternal autonomy support related positively to children's need satisfaction. Furthermore, there was a significant indirect association between maternal autonomy support and sibling autonomy support via children's need satisfaction, $B = .07$ ($SE = .03$), $p < .01$; 95% CI [0.02, 0.12]. The direct path between maternal and sibling autonomy support was not significant. Notably, there also was a direct positive association between mothers' need satisfaction and sibling autonomy support. Both effects were obtained after taking into account a strong perceiver effect: Children tended to perceive their mother and their sibling as similarly autonomy-supportive. Finally, maternal autonomy support, need satisfaction, and sibling autonomy support experienced by the younger children related positively to the corresponding measures in the older children (although only marginally significant with respect to need satisfaction).

Supplementary Analyses

In a series of supplementary analyses, we examined the robustness of our proposed model. First, to investigate the generalizability of our model across child age and gender, we included both background variables as moderators in the following relations: (a) mothers' need satisfaction to maternal autonomy support, (b) maternal autonomy support to children's need satisfaction, and (c) children's need satisfaction to sibling autonomy support. None of the interaction terms involving child age and gender were significant, indicating that age and gender of the child did not moderate the main paths in our final model.[2] To investigate whether the gender composition of the sibling pairs affected the paths in our final model, we performed a multigroup comparison. Specifically, we created three groups of sibling pairs: (a) sibling pairs of two sisters, (b) siblings pairs of two brothers, and (c) sibling

[2] Post hoc power analyses based on Monte Carlo simulation (Wolf, Harrington, Clark, & Miller, 2013) revealed that the study had sufficient power to detect small to medium moderating effects of gender and age for the association between maternal autonomy support and children's need satisfaction and for the association between children's need satisfaction and sibling autonomy support but that only large moderating effects of age and gender could be detected for the association between mothers' need satisfaction and maternal autonomy support. Future research testing the moderating role of gender and age would do well to rely on larger samples.

pairs of one sister and one brother. We compared an unconstrained version of the final model (Model 4; that is, a version of the model in which the parameters were allowed to vary across the three sibling groups) with a model wherein we constrained all paths in the model to be similar for three groups of sibling pairs. In this way, we could determine whether the relations between the constructs in our model were equally strong for these three types of sibling pairs. A chi-square difference test indicated that both models fitted the data equally well, indicating that the paths in the model did not differ between the three types of sibling pairs, χ^2 difference (36) = 46.59, $p < .05$.

Second, to examine whether mothers' self-esteem would serve as a confounding variable in the relation between mothers' need satisfaction and autonomy support (for the younger siblings), we tested a series of models wherein we controlled for maternal differences in self-esteem. Results showed that the initial associations observed in Model 1 remained significant, with maternal need satisfaction yielding a significant positive association with maternal autonomy support as reported by the younger sibling, $B = .31$ ($SE = .08$), $p < .01$, but not as reported by the older sibling, $B = -.01$ ($SE = .06$), $p > .05$. As for Model 2, maternal need satisfaction also remained associated significantly with children's need satisfaction, $B = .09$ ($SE = 04$), $p < .05$, for both siblings, after controlling for maternal self-esteem. These findings suggest that the observed associations of maternal need satisfaction with perceived autonomy support and sibling need satisfaction are not spurious.

Third, we tested a model wherein all the paths in our final model (Model 4) were reversed. It is indeed possible that the degree to which a mother is autonomy-supportive (according to her children) predicts her level of psychological need satisfaction. In general, all paths in this reversed model were positive and significant, with the exception of the path from maternal autonomy support as reported by the older sibling to mothers' need satisfaction. The Akaike Information Criterion (AIC) was used to decide whether this reversed model or the final model (Model 4) as previously presented was the best with respect to fit to the data and simplicity, with a smaller AIC indicating the better model (Burnham & Anderson, 2004). The AICs of the models indicated that the proposed model (AIC = 3,045.40) had a

slightly better fit than the alternative model (AIC = 3,056.93). Although these supplementary analyses seem to corroborate the robustness of our model, future longitudinal research is needed to really examine the direction of effects.

Discussion

Grounded in SDT (Deci & Ryan, 2000), abundant research has shown that parental autonomy support is essential for children's psychosocial functioning (e.g., Grolnick et al., 1991; Joussemet, Landry, & Koestner, 2008; Soenens & Vansteenkiste, 2010). Yet, there is comparatively less research on the origins of an autonomy-supportive parenting style (e.g., Grolnick & Apostoleris, 2002). In addition, because research on autonomy support in families has typically focused on the parent-child dyad only, possible associations between an autonomy-supportive parenting style and the way siblings interact with one another have not been directly examined up till now. This study intended to address these lacunae.

Psychological Need Satisfaction as a Resource for Autonomy-Supportive Parenting

An autonomy-supportive parenting style requires attentiveness, patience, and energy from the side of parents (Joussemet, Landry, & Koestner, 2008). That is, to fully take the frame of reference of the child, to offer choices consistent with the child's preferences, and to provide truly meaningful rationales, parents need to be psychologically available, that is, receptive for what is going on for the child. We reasoned that the satisfaction of parents' own psychological needs for autonomy, competence, and relatedness would generate this level of energy and open-mindedness required to be autonomy-supportive (Ryan & Frederick, 1997).

Consistent with this hypothesis, we found that mothers who experienced more need satisfaction were perceived as being more autonomy-supportive by their children. Yet, rather unexpectedly, this effect was only observed in younger and not in older siblings. Future research is needed to see whether this null finding can be replicated. For the time being, we can only speculate about possible reasons for

this unexpected finding. Possibly, mothers with multiple children pay relatively more attention to the youngest child and display comparatively more active involvement in his or her activities because he or she is less independent and more in need of care than the older child. As such, mothers' level of need satisfaction may manifest more strongly in the interaction with the younger child. In other words, the benefits of need satisfaction may emerge particularly strongly in relation to the child requiring the most care and posing the most challenges to mothers' parenting skills, as experiences of need satisfaction precisely allow one to stay psychologically available and patient and to keep taking the child's viewpoint. If this speculative reasoning holds true, future research could also address the possibility that parents' need satisfaction is particularly important for parents' communication style in interaction with temperamentally difficult children.

It is important for future research to gain more insight in the association between parental need satisfaction and autonomy support. This can be done by examining whether certain factors mediate or moderate the relation between parental need satisfaction and parental autonomy support. As regards mediation, we hypothesized that parental feelings of vitality and energy could be general explanatory mechanisms. In addition, future studies could investigate whether these general feelings of energy translate into more specific resources, including enhanced receptivity and openness (Hodgins et al., 1996) and psychological availability (Danner-Vlaardingerbroek et al., 2013). An explicit examination of these mediating mechanisms could also help to test an implicit assumption behind the link between mothers' psychological need satisfaction and provided autonomy support: Providing autonomy support would require more effort and energy (which are provided by higher levels of psychological need satisfaction) than being controlling. It seems likely that, in the moment, autonomy-supportive parenting requires energy because listening carefully to the child's wishes and complaints requires effort, patience, and concentration. In the longer run, however, autonomy-supportive parenting might be less effortful than controlling parenting because it lays a foundation for a child's deep internalization of parental values (Grolnick et al., 1991) and for a smooth parent-child dialogue (Mauras, Grolnick, &

Friendly, 2013). As such, parents would not continuously need to reiterate requests and may even derive energy from the pleasant and open conversations they have with their children. In contrast, controlling parenting relates to various problems including halfhearted enactment of parental requests (Assor, Roth, & Deci, 2004), blunt defiance against the parents' requests (Van Petegem, Soenens, Vansteenkiste, & Beyers, 2015), and secrecy (Tilton-Weaver et al., 2010). Dealing with such problems is likely to consume parental energy in the longer run.

With regard to possible moderators, it could be the case that for need satisfaction to translate into the provision of autonomy support, parents need to value autonomy. Although a previous study did not yield evidence for such a moderating effect of autonomy valuation on the relation between need satisfaction and personal well-being (Chen et al., 2015), the moderating role of need valuation also needs to be determined in family dynamics. Moreover, although an innovative aspect of this study was the focus on general, as opposed to context-specific, psychological need satisfaction, future studies could include measures of both general as well as relationship-specific need satisfaction to investigate the unique relations with provided autonomy support.

Future studies could also investigate the relation between more distal sources of parental autonomy support and parental need satisfaction. Theoretically, a distinction has been made between three types of more distal antecedents of parenting (Belsky, 1984; Grolnick & Apostoleris, 2002), that is, (a) child characteristics (e.g., low school performance), (b) social-contextual characteristics (e.g., neighborhood safety), and (c) parent characteristics (e.g., personality characteristics). Undoubtedly, these three factors feed into mothers' overall psychological need satisfaction (Milyavskaya, Philippe, & Koestner, 2013). Accordingly, future research may investigate whether parents' need satisfaction explains why some contextual, personal, and child-related factors strengthen parents' capacity to engage in autonomy-supportive parenting while other factors undermine this capacity and even render parents vulnerable to engagement in ineffective parenting strategies.

Maternal Autonomy Support and Children's Psychological Need Satisfaction

Although mothers' need satisfaction did not relate to perceived maternal autonomy support in the older siblings, younger as well as older siblings who perceived more maternal autonomy support reported more experiences of need satisfaction. This finding is in line with previous studies demonstrating the beneficial effects of parental autonomy support on children's need satisfaction (e.g., Vierling et al., 2007). Finally, in younger siblings, mothers' need satisfaction related to children's need satisfaction via maternal autonomy support. Mothers who experience more autonomy, competence, and relatedness are more likely to be perceived as autonomy-supportive by their (younger) children who, in turn, themselves report feeling more autonomous, competent, and related. The observation of such intergenerational similarity is encouraging because it suggests the possibility of a positive spiral across generations. While many studies have demonstrated intergenerational similarity and even transmission of maladaptive traits and parenting behaviors, relatively fewer studies have addressed and documented intergenerational similarity of adaptive experiences such as need satisfaction (Belsky, Jaffee, Sligo, Woodward, & Silva, 2005).

In a set of supplementary analyses, we examined the unique predictive value of mothers need satisfaction. Maternal need satisfaction was related to maternal autonomy support (only for younger siblings) and to both children's need satisfaction even after controlling for mothers' more general level of adjustment, as indicated by their self-esteem. Future research could include additional indicators of mothers' general adjustment to examine the associations in our model in even more conservative ways.

The finding that mothers' need satisfaction was related to more autonomy-supportive parenting (at least among younger siblings) and to higher child need satisfaction highlights the necessity for parents to monitor and manage their own need satisfaction. To the extent that future (preferably longitudinal and experimental) studies confirm this finding, it may have practical implications because it suggests promising ways to strengthen parents' capacity to be autonomy-supportive through prevention or intervention programs. Parents may be taught to engage in self-care, that is, to become

aware of their own psychological needs and to seek opportunities for need satisfaction, as to increase their likelihood of engaging in an autonomy-supportive style toward their children.

Maternal Autonomy Support, Need Satisfaction, and Sibling Autonomy Support

Past research has shown convincingly that perceived maternal autonomy support contributes not only to the child's personal well-being and development (e.g., Bernier et al., 2010; Grolnick et al., 1991) but also to children' social and interpersonal functioning (e.g., Joussemet, Vitaro, et al., 2008; Soenens & Vansteenkiste, 2005). While past work has focused primarily on the relational benefits of maternal autonomy support *outside* the family, herein, we examined whether similar benefits would emerge *within* the family, that is, in terms of sibling dynamics. Interestingly, this appeared to be the case, as child-perceived maternal autonomy support related to mutual sibling autonomy support via children's need satisfaction, a pathway that was found among both younger and older siblings.

The evidence for this pathway is remarkable, as we tested it in a fairly conservative way. First, these associations emerged after controlling for perceiver effects, that is, the tendency for children perceiving their mother as more autonomy-supportive to also perceive their sibling as being more autonomy-supportive. This perceiver effect was quite strong and is consistent with past work on other features of the family climate (e.g., Manders et al., 2009). Second, sibling autonomy support was not assessed at exactly the same time point and using the same methodology as children's need satisfaction. Instead, we used a diary assessment of sibling autonomy support, a type of methodology that helps to overcome problems with retrospective reporter bias. Third, a multi-informant design was used, as need satisfaction reported by the youngest (oldest) sibling was related to sibling autonomy support as reported by the oldest (youngest) sibling.

Two other findings deserve being mentioned. First, there was a direct positive association between mothers' need satisfaction and sibling autonomy support. Apparently, mothers' need satisfaction contributes to an autonomy-supportive interaction style between siblings not only through an indirect pathway (i.e., via an autonomy-supportive parenting style and children's need satisfaction)

but also via a more direct pathway. Possibly, through a process of motivational contagion (Radel, Sarrazin, Legrain, & Wild, 2010), mothers' experiences of need satisfaction and corresponding levels of vitality translate quite directly and vicariously into more need-supportive interactions among family members. Second, older siblings were perceived to be less autonomy-supportive toward their younger siblings than vice versa. This finding is in line with Buhrmester and Furman (1990), who found that sibling relationships become less intense and nurturing when children move toward adolescence.

Although this study confirmed the mediating role of children's need satisfaction in the relation between maternal and sibling autonomy support, future studies could examine other possible mechanisms. For example, from a spillover perspective, observational learning is one potential mechanism through which behaviors and emotions are transferred from one subsystem of a family (e.g., parent-child) to another subsystem (e.g., sibling-sibling; Erel & Burman, 1995). Children may observe the interaction between their mother and themselves and copy this interaction style toward their sibling. Note, however, that we did not find a direct relation between maternal and sibling autonomy support when children's need satisfaction was taken into account.

According to family systems theory, the family is a complex and multilayered system in which personal features of family members, processes within specific dyads, and processes at the level of the family as a whole are in continuous and reciprocal interaction with each other (e.g., Minuchin, 1985). One type of methodology used to chart such family processes more comprehensively is a round-robin design (in which all family members report on each other) and corresponding social relations model (SRM) analyses (Cook, 2005; Eichelsheim, Dekovic, Buist, & Cook, 2009). A logical next step after this study is a full SRM analysis to examine autonomy support in every dyad of the family. In addition, future studies could further investigate the relation between each of the three psychological needs and provided autonomy support. Complementary correlational analyses[3] indicated that the most substantial

[3] In an additional set of correlation analyses, we also examined the relation between each of the three psychological needs (as reported by the mother and children) and autonomy support provided by the mother and by the children. Results showed that the relation between mothers' need satisfaction and maternal autonomy

associations between experienced need satisfaction and autonomy support are obtained with the need for autonomy.

Limitations

This study had several limitations. First, we only included mothers and two of their children, thereby excluding fathers and possible other children. Several studies have shown that paternal and maternal autonomy support both foster positive psychological functioning in children and adolescents (e.g., Grolnick et al., 1991). However, other studies have shown that fathers and mothers may affect developmental outcomes in children differently (e.g., Guay, Ratelle, Larose, Vallerand, & Vitaro, 2013; Soenens & Vansteenkiste, 2005). It is important, therefore, for future research to include fathers. Furthermore, previous studies have shown that there is a moderate similarity between the quality of the sibling relationship across different sibling-dyads within one family (e.g., Jenkins, Dunn, O' Connor, Rasbash, & Behnke, 2005). Nevertheless, it is important for future studies to include multiple sibling-dyads per family to investigate whether the beneficial effects of autonomy-supportive parenting apply to all sibling-dyads within one family. In addition, as we did not undertake specific actions to ensure the independence of the sibling report, future studies need to consider this issue further.

A second limitation is the correlational design, which hindered us to investigate family dynamics over time. Although the current study aimed at investigating the effects of parenting on sibling interactions, other studies have shown that sibling relations can also influence the parent-child and the mother-partner relationship (e.g., Dunn, Deater-Deckard, Pickering, Golding, & ALSPAC Study Team, 1999). Future studies could therefore investigate reciprocal relations between sibling autonomy support and parental autonomy support. Furthermore, a longitudinal design (e.g., from middle childhood to early adolescence) would also permit to investigate changes over time in mean

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support seems to be based primarily on autonomy need satisfaction. With respect to the relation between children's need satisfaction and provided sibling autonomy support, particularly in older siblings, both autonomy and relatedness need satisfaction were important. For both types of relations, though, competence satisfaction was unrelated to autonomy support.

levels of and structural relations between maternal autonomy support, need satisfaction, and provided sibling autonomy support.

Furthermore, although we employed multiple informants and controlled for perceiver effects, we had only questionnaire data, which have well-known disadvantages (e.g., lack of detail; Kelley, Clark, Brown, & Sitzia, 2003). Future studies could, therefore, employ other techniques to assess family dynamics of autonomy support and psychological need satisfaction, such as observations of family interactions. Finally, we also need to be careful about generalizing the obtained pattern of findings to the broader population as the data were collected by undergraduate students, a procedure that may have resulted in a relatively homogeneous sample of families (Bornstein, Jager, & Putnick, 2013).

Conclusion

This study provided evidence for an important sequence of events regarding the provision of autonomy support in families and the role of psychological need satisfaction therein. Mothers experiences of volition (autonomy), effectiveness (competence), and connection (relatedness) were related to a more autonomy-supportive parenting style (albeit only among younger siblings), which, in turn, was related to children's experiences of psychological need satisfaction. Children's experiences of need satisfaction were related to a higher provision of autonomy support in sibling relations, suggesting a dynamic interplay between maternal autonomy support and mutual autonomy support among siblings via experiences of need satisfaction. Overall, these findings point to the relevance of a dynamic perspective on autonomy support and psychological need satisfaction within the family.

Supplemental Material

The online supplemental material is available at http://pspb.sagepub.com/supplemental.

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From Daily Need Experiences to Autonomy-supportive and Psychologically Controlling Parenting via Psychological Availability and Stress[1]

The current study sought to identify intervening processes linking parental need experiences to parenting behavior, thereby focusing on the role of parental psychological availability and stress. In total, 206 mothers (*M*age = 40.33 years) and 206 fathers (*M*age = 42.36 years) and their elementary school child (*M*age = 9.93 years; 46.6% female) participated in a 7-day multi-informant diary study. While parents' daily need satisfaction was related to more psychological availability, parental need frustration was related to higher stress in parent-child interactions. In turn, psychological availability and stress were related to a higher degree of child-perceived autonomy support and psychological control, respectively. The importance of parental need-based experiences and subsequent daily parental resources for parenting is discussed.

[1] Van der Kaap-Deeder, J., Soenens, B., Mabbe, E., Dieleman, L., Mouratidis, A., Campbell, R., & Vansteenkiste, M. (2016). From daily need experiences to autonomy-supportive and psychologically controlling parenting via psychological availability and stress. *Manuscript submitted for publication.*

Introduction

While the quality of parenting styles have traditionally been described in terms of inter-individual differences between parents, there is increasing evidence that parental behavior varies across short periods of time and even on a daily basis (Repetti, Reynolds, & Sears, 2015). When it comes to parenting, one day is not the other. This is true for several features of parenting that are important for children's well-being, including parental autonomy-supportive (Van der Kaap-Deeder, Vansteenkiste, Soenens, & Mabbe, in press) and psychologically controlling practices (Aunola, Tolvanen, Viljaranta, & Nurmi, 2013). Relatively little is known, however, about the sources of these daily variations. Towards this end, a number of studies grounded in Self-Determination Theory (SDT; Deci & Ryan, 2000) have begun to demonstrate the role of daily parental satisfaction and frustration of the psychological needs for autonomy, competence, and relatedness in parenting. These parental need experiences have been found to relate to provided autonomy support and psychological control, both at the level of between-parent differences (Van der Kaap-Deeder, Vansteenkiste, Soenens, Loeys, Mabbe, & Gargurevich, 2015) and at the level of daily variation in parental behavior (Mabbe, Soenens, Vansteenkiste, Van der Kaap-Deeder, & Mouratidis, 2016a). However, the mechanisms behind these relations are not clearly understood. Therefore, we aimed to identify intervening processes linking parents' daily need experiences to parents' engagement in autonomy-supportive and psychologically controlling practices. Specifically, we focused on the role of parental feelings of psychological availability and stress as experienced within the parent-child relationship.

Parental Autonomy Support and Psychological Control

Within SDT, a broad theory on human motivation and socialization, autonomy support is said to be key to children's optimal psychological development (Deci & Ryan, 2000). Autonomy support is characterized by the promotion of children's volitional functioning and self-endorsement (e.g., Grolnick, Ryan, & Deci, 1991; Ryan, Deci, & Vansteenkiste, 2016; Soenens et al., 2007). Autonomy-

supportive parents adopt children's frame of reference and stimulate experiences of choice and initiative, thereby taking into account children's pace of development. They also provide a meaningful rationale when choice is constrained. In contrast, psychological control involves parental pressure to make children think, feel, and act in specific ways (Grolnick & Pomerantz, 2009; Soenens & Vansteenkiste, 2010). For instance, psychologically controlling parents rely on guilt induction (Chen, Soenens, Vansteenkiste, Van Petegem, & Beyers, 2016) and love withdrawal (Assor, Roth, & Deci, 2004) to impose their own viewpoint.

Recent theorizing (Vansteenkiste & Ryan, 2013) and empirical studies (e.g., Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011) suggest that autonomy support and psychological control represent fairly distinct (rather than complete opposite) constructs. That is, a lack of autonomy support does not by default imply the presence of psychological control. To illustrate, a parent who provides only a few choices (i.e., low autonomy support) does not necessarily pressure the child to act in a certain way (i.e., high psychological control). Conversely, an absence of psychological control cannot be equated with the presence of autonomy support. For example, a parent who refrains from using love withdrawal may not necessarily encourage the child to take initiative. This distinction between autonomy support and psychological control is important because there is increasing evidence for differential associations between these parenting variables and developmental outcomes. Specifically, a distinction can be made between a bright pathway (with autonomy support relating primarily to adaptive outcomes) and a dark pathway (with psychological control relating primarily to maladaptive outcomes) of socialization and development (Costa, Cuzzocrea, Gugliandolo, & Larcan, 2016; Vansteenkiste & Ryan, 2013).

Multiple studies, most of which were conducted with elementary school children and adolescents, have now demonstrated the beneficial effects of parental autonomy support (e.g., Ferguson, Kasser, & Jahng, 2011) and the detrimental effects of psychological control (e.g., Pettit,

Laird, Dodge, Bates, & Criss, 2001) on children's well-being and adjustment. Among elementary school-aged children, parental autonomy support has been found to relate to beneficial outcomes, including school performance (Grolnick et al., 1991), interest in mathematics (Aunola et al., 2013), and autonomous motivation for engaging in physical activity (Vierling, Standage, & Treasure, 2007). In contrast, parental psychological control has been linked to maladaptive developmental outcomes such as ill-being (i.e., negative affect) (Barber, 1996; Van der Kaap-Deeder et al., in press) and internalizing and externalizing problems (Barber & Xia, 2013; Mabbe, Soenens, Vansteenkiste, & Van Leeuwen, 2016b).

An important and fairly recent development in research on socialization is the increasing recognition that parenting is a dynamic process characterized by situational and short-term variability (Dix, 1991; Holden & Miller, 1999; Repetti et al., 2015). Indeed, research has shown that about 50% of the variance in autonomy support and psychological control reflects daily fluctuations in parenting practices (e.g., Mabbe et al., 2016a). More importantly, such daily variations in parenting have been found to relate to children's psychological functioning on a day-to-day basis. For instance, Aunola et al. (2013) showed that daily variations in parental psychological control related to daily fluctuations in elementary school children's negative affect (based on parent-reports), while Van der Kaap-Deeder et al. (in press) further showed that daily maternal autonomy support and psychological control related to children's daily well-being and ill-being, respectively (based on child-reports).

Parents' Psychological Need Satisfaction and Need Frustration

Considering the effects of daily parental provision of autonomy support and psychological control on children's daily psychological functioning, research needs to shed light on why parents manage to be attuned to their child's perspective on some days while they impose their own frame of reference on other days. To address this question, research needs to go beyond the identification of antecedents of parental behavior situated at the level of fairly stable between-parent differences, such

as parental self-critical perfectionism (Soenens, Elliot, Goossens, Vansteenkiste, Luyten, & Duriez, 2005) and general parental trust in the natural, growth-oriented development of children (Landry et al., 2008).

To explain sources of variation in daily parental behavior, it is important to look into parental experiences and processes that fluctuate dynamically on a day-to-day basis. One set of parental experiences meeting this criterion involves parents' experiences relevant to their own basic psychological needs for autonomy, competence, and relatedness. Autonomy denotes the experience of a sense of psychological freedom and volition. Competence refers to feeling successful in daily activities. Finally, relatedness encompasses the experience of connectedness with important others. Need-frustrating experiences, on the other hand, refer to feelings of pressure (i.e., autonomy frustration), feelings of failure (i.e., competence frustration), and experienced exclusion and social isolation (i.e., relatedness frustration).

Within SDT it is claimed that the satisfaction of these three basic psychological needs is crucial for individuals' well-being and the quality of their interpersonal relationships (Deci & Ryan, 2000), while the very frustration of these psychological needs relates to ill-being and impaired social functioning (e.g., hostility and defensiveness). Note that, similar to the distinction between autonomy support and psychological control, need satisfaction and need frustration are regarded and have been found to be distinct (rather than perfectly opposite) constructs (Vansteenkiste & Ryan, 2013). To illustrate, experiencing a low level of connection with another person (i.e., low relatedness satisfaction), does not necessarily imply feeling excluded and rejected by this other person.

A vast number of studies have documented the beneficial effects of need satisfaction (e.g., on well-being and engagement) and the detrimental effects of frustration of these needs (e.g., in terms of ill-being and psychopathology) (see for an overview Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). Such findings were documented at both the between-person and within-person level (e.g., Ryan,

Bernstein, & Brown, 2010; Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013), using both self-reported and objective markers of (mal)adjustment (e.g., Bartholomew et al., 2011), and across domains (e.g., at school, at home and with friends; Milyavskaya et al., 2009) and diverse cultures (Chen et al., 2015).

More recently, need-based experiences have not only been considered as predictors of individuals' personal functioning, but also of their interpersonal functioning. The overall argument developed within SDT is that socializing agents' need-satisfying experiences allow them to adopt a more autonomy-supportive approach, while need-frustrating experiences elicit more self-centeredness and a tendency to relate to others in a more pressuring way. Some evidence exists for this proposed link between the parental needs for autonomy, competence, and relatedness, and provided autonomy support or psychological control. At the between-parent level, a few studies have shown that parental need satisfaction related to less controlling parenting (de Haan, Soenens, Dekovic & Prinzie, 2013) and to more autonomy-supportive parenting (Van der Kaap-Deeder et al., 2015). However, only one study to date has examined these associations at the daily level. Mabbe et al. (2016a) showed that daily variations in parental need satisfaction and need frustration related to daily variations in, respectively, parents' autonomy support and psychological control towards their adolescent child. An important limitation of this study was the exclusive reliance on parent reports of both need-based experiences and parenting, which may have caused the observed associations to be artificially inflated through shared method variance. To address this issue, in the present study we relied on a multi-informant approach by asking parents to report on their need experiences and children to report on their perceived daily parenting. This approach is favorable because it is ultimately children's perception and interpretation of parental behavior (rather than the parents' point of view) that will relate to their well-being (Sessa, Avenevoli, Steinberg, & Morris, 2001; Soenens, Vansteenkiste, & Van Petegem, 2015).

Possible Mechanisms of the Relation between Parents' Needs and Parenting

An important next step in research on the sources of daily variation in parental behavior is to gain a deeper understanding of the underlying mechanisms involved. Herein, we aimed to build on the limited available research by examining possible mechanisms of the hypothesized relation between daily need-based experiences and daily parenting. Specifically, we considered two possible candidates as intervening variables, that is, parents' daily psychological availability and stress as experienced in the parent-child relationship. Compared to need-based experiences, we considered these variables to be more proximal predictors of provided autonomy support and psychological control, thus potentially explaining why parents who experience need satisfaction (or need frustration) are more likely to be autonomy supportive (or controlling) towards their children.

Psychological availability refers to "the ability and motivation to direct psychological resources toward the child" (Danner-Vlaardingerbroek, Kluwer, Van Steenbergen, & Van der Lippe, 2013b, p. 742). Psychologically available parents are not only physically present, but are also emotionally and cognitively available for the child. To be psychologically available towards one's child requires energy from parents. Parents' psychological needs may represent an important resource for such energy. Previous studies have indeed shown the vitalizing and the energy-depleting effects of, respectively, a high level of need satisfaction and a high level of need frustration (see for an overview Ryan & Deci, 2008). We expected that such increased energy resulting from need satisfaction would relate to a higher level of parental psychological availability. In contrast, because of its energy-depleting effect parental need frustration was expected to relate negatively to psychological availability. In turn, this parental psychological availability is expected to relate positively to parents' provided autonomy support and negatively to parents' use of psychological control.

Indirect evidence for this hypothesis comes from a study by Danner-Vlaardingerbroek et al. (2013b) who showed that work-related positive affect and energy related to higher levels of paternal

and maternal psychological availability which, in turn, related to more positive parent-child interactions. In contrast, work-related negative affect, exhaustion, and rumination related to less psychological availability and in turn to more negative parent-child interactions (Danner-Vlaardingerbroek et al., 2013b). Research with respect to mindful parenting also seems relevant because, much like psychological availability, mindfulness involves being attentive to and aware of experiences in the current moment (Duncan, Coatsworth, & Greenberg, 2009). A growing number of studies indicate the positive effects of mindful parenting for both parents' and children's well-being as well as the parent-child relationship (Bogels, Hellemans, van Deursen, Romer, & van der Meulen, 2014).

Another likely mechanism, apart from psychological availability, is parental stress. Stress can be defined as "a relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and as endangering his or her well-being" (Folkman, 1984, p. 840). We propose that higher levels of need frustration and lower levels of need satisfaction can invoke feelings of parental stress, which hinders parents' capacity to be autonomy supportive and which engenders an increased likelihood of engaging in psychologically controlling practices. Several studies have shown that whereas need satisfaction reduces individuals' levels of stress, need frustration relates to increases in stress (e.g., Campbell, Vansteenkiste, Beyers, Verstraete, & Soenens, 2016; Reeve & Tseng, 2011; Weinstein & Ryan, 2011). Accordingly, it is expected that parents who experience low need satisfaction or high need frustration (i.e., parents who feel pressured, incompetent, and excluded by others in their daily activities) experience more symptoms of stress such as tension and over-arousal. Due to these symptoms of stress parents are likely to become more preoccupied with their own problems, resulting in a more self-centered parental approach and a tendency to impose their own standards and expectations in a pressuring fashion.

Abundant research, much of which was conducted among parents of preschool children (Guajardo, Snyder, & Petersen, 2009; Prinzie, Onghena, & Hellinckx, 2007) but some of which also involved parents of adolescents (Conger, Patterson, & Ge, 1995), has demonstrated effects of parental stress on dysfunctional parenting practices (e.g., over-reactivity and power-assertive methods). However, research dealing more specifically with the role of stress in autonomy-supportive and psychologically controlling parenting is scarcer (Gurland & Grolnick, 2005; Grolnick, Weiss, McKenzie, & Wrightman, 1996). Additionally, although these studies suggest that parental stress is involved in parents' engagement in more controlling practices, this association has not been systematically addressed yet in diary studies. Aunola, Viljaranta, and Tolvanen (2016) provided indirect evidence for an association between parental stress and controlling parenting at the daily level in a diary study with parents of elementary school children. Specifically, they showed that daily fluctuations in parents' general negative emotions were positively related to parents' daily displays of psychological control.

The Present Study

The overall aim of this study was to investigate the mechanisms behind the day-to-day relations between parents' need satisfaction and frustration on the one hand and autonomy-supportive or psychologically controlling parenting on the other hand. The hypothesized integrated model is shown in Figure 1. This model was tested among parents of elementary school children. In accordance with the assumption of a bright and dark socialization pathway (Vansteenkiste & Ryan, 2013), we hypothesized that whereas need satisfaction would be especially related to higher levels of autonomy support via psychological availability, need frustration would mostly relate to higher levels of psychological control through stress. Additionally, we explored whether the gender of the parent would moderate the relations between the study variables. Because most diary studies to date have shown that

processes involved in parents' daily use of autonomy support and psychological control are fairly similar across mothers and fathers (e.g., Mabbe et al., 2016a), we did not expect parental gender to play a substantial moderating role.

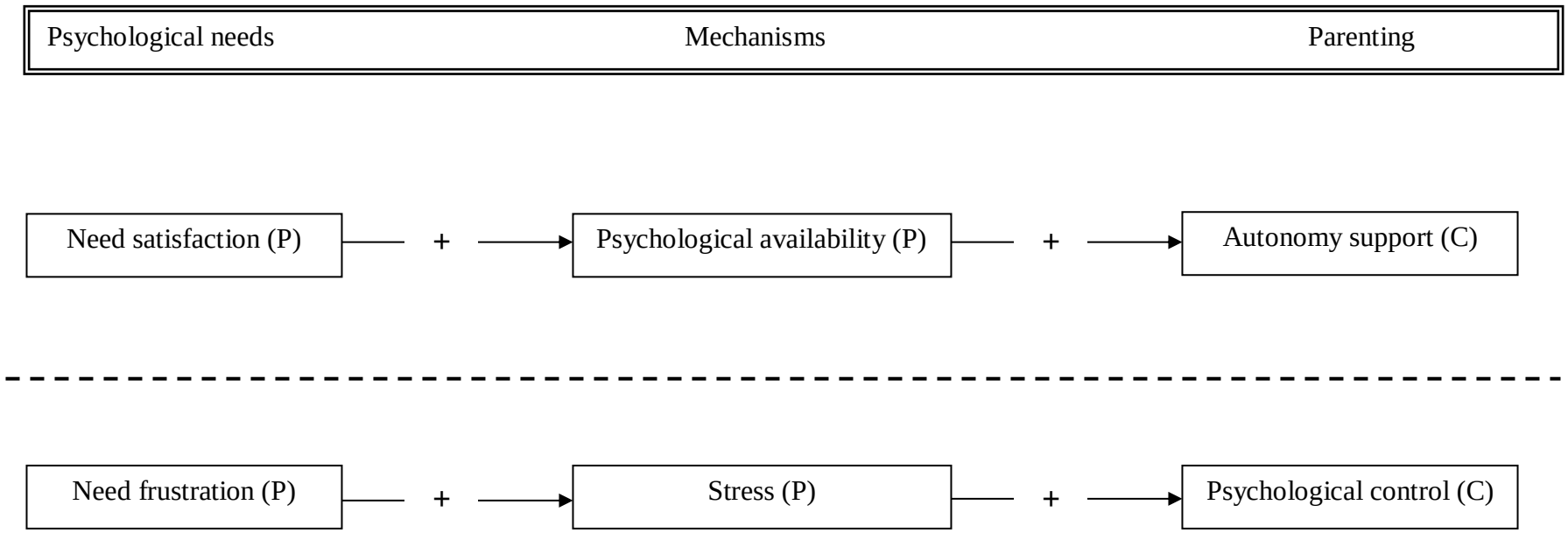

Figure 1. The Hypothesized Model based on Self-Determination Theory.

C = Child-report. P = Parent-report.

Method

Participants and Procedure

Participants were 206 Belgian mothers (*M*age = 40.33 years, *SD* = 4.37, range 27 - 52) and fathers (*M*age = 42.36 years, *SD* = 5.30, range 29 - 67) and their elementary school child (46.6% female, *M*age = 9.93 years, *SD* = 0.94, range 8 - 12). Regarding educational level, 18.5% of the mothers and 28.5% of the fathers completed secondary school, whereas 81.6% of the mothers and 71.4% of the fathers followed higher education. In most families there were two (48.5%) or three (33.0%) children. Additionally, parents were either married (79.9%) or living together (without being married) (20.1%).

Families were recruited as part of an undergraduate course in developmental psychology. In exchange for course credits, students were asked to invite two families (who were not relatives of the student) who had at least one child in elementary school between the age of 8 and 12. If a family had more children between the ages of 8 and 12, students were asked to select the oldest child within the age category. Students were trained to approach potentially interested families (of which the mother, father and child were willing to participate) and to collect the data in a one-hour information session with the first author. Further assistance during the data-collection, when necessary, was provided to the students via e-mail. Students explained how to fill the diary booklet in during a home visit. Participants (i.e., mothers, fathers, and children) were informed that there were no right or wrong answers, that their answers would be treated in a confidential way, and that they could leave an item unanswered if they were unsure. Additionally, the diary booklet itself also contained detailed instructions. Participants were instructed to fill out the diary questionnaires each day in the evening for seven consecutive days, thereby noting the date and time of each assessment (if the child was unsure about this particular information, it was stated that he/she could ask help from the parent), and they were also instructed to check for missing answers each day. Additionally, participants were sent a daily reminder to fill out the

questionnaires via text message or email (only if approved by the parents) so as to avoid missing cases. Participation was anonymous, voluntary, and families did not obtain any reward. Furthermore, both mothers and fathers gave their written consent on behalf of their child and themselves. Children also gave their written consent for their participation. This procedure was in accordance with the guidelines and protocol of the university's Ethical Committee.

Whereas parents were asked to answer items assessing their own psychological functioning each day (i.e., need satisfaction, need frustration, parental psychological availability, and parental stress), children filled out questionnaires assessing daily parent-provided autonomy support and psychological control. We chose to employ child-reported assessments of parenting, because previous studies have shown that child-perceived parenting is especially predictive of children's psychological functioning (Pettit et al., 2001).

Measures

All items were answered on a Likert scale ranging from 1 (*not at all true*) to 5 (*completely true*), unless indicated otherwise. The internal consistencies of all used scales can be found in Table 1.

Table 1

Descriptives of and Correlations between the Study Variables (Mother below, Father above diagonal)

	Range α mother	Range α father	1	2	3	4	5	6
1. Need satisfaction	.77-.85	.72-.86	-	-.72**	.37**	-.24**	.18**	-.05
2. Need frustration	.77-.81	.75-.85	-.79**	-	-.38**	.45**	-.15*	.13
3. Parental PA	.84-.90	.84-.91	.52**	-.49**	-	-.18*	.29**	-.07
4. Parental stress	.84-.91	.84-.94	-.32**	.47**	-.30**	-	-.20**	.22**
5. Autonomy support	.68-.75	.68-.80	.23**	-.19**	.21**	-.25**	-	-.31**
6. Psychological control	.62-.74	.68-.78	-.19**	.25**	-.08	.24**	-.30**	-
Mean mother			4.08	1.60	3.71	0.27	3.60	1.54
SD mother			0.41	0.43	0.55	0.40	0.72	0.52
Mean father			4.06	1.60	3.58	0.21	3.50	1.52
SD father			0.44	0.44	0.58	0.37	0.80	0.56

Note. Whereas need satisfaction, need frustration, psychological availability, and stress were reported by the parents, autonomy support and psychological control were reported by the child. PA = psychological availability.

*$p < .05$; **$p < .01$.

Psychological Need Satisfaction and Need Frustration. Mothers' and fathers' daily experienced need satisfaction and need frustration were each assessed with six items (2 items per need) from the Basic Psychological Need Satisfaction and Need Frustration scale (BPNSNF; Chen et al., 2015). So as not to overburden the parents, we chose to administer this shortened 12-item version of the BPNSNF scale, rather than the full 24-item version. Additionally, items were slightly adapted to make them suitable for a diary assessment. This abbreviated version of the BPNSNF has been used successfully in diary research before (Mabbe et al., 2016a). Example items are: "Today, I felt a sense of choice and freedom in the things I undertook" (autonomy satisfaction), "Today, I felt forced to do many things I wouldn't choose to do" (autonomy frustration), "Today, I felt confident that I could do things well"(competence satisfaction), "Today, I felt insecure about my abilities" (competence frustration), "Today, I felt connected with people who care for me, and for whom I care"(relatedness satisfaction), and "Today, I felt excluded from the group I want to belong to" (relatedness frustration).

Parental Psychological Availability. The extent to which parents felt they were psychologically available for their child was assessed daily with three items taken from the 8-item parent-version of the Daily Psychological Availability Scale (Danner-Vlaardingerbroek et al., 2013a, b). In selecting these three items, we did not include items that were phrased negatively (3 items) and we kept the items that tapped into psychological availability most directly. Items were preceded by the stem "When I spent time with my son/daughter today, …". Items were: "My thoughts were completely focused on my child", "I was entirely open to what my child had to tell me", and "I was fully available for the activities with my child". Responses were indicated on a Likert scale ranging from 1 (*Not at all experienced*) to 5 (*Very strongly experienced*).

Parental Stress. Stress as experienced by the parents when with their child, was assessed using three items of the stress subscale from the short-form version of the Depression Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 2004). The items were slightly adapted to make them appropriate

for diary assessment and to make them applicable to the parent-child situation. Items were preceded by the stem "When I spent time with my son/daughter today, …". Items were: "I was very stressed out", "I found it difficult to relax", and "I noticed that I was very restless". Responses were indicated on a Likert scale ranging from 0 (*Not at all*) to 3 (*Definitely*).

Autonomy Support and Psychological Control. Children reported on the perceived degree of autonomy support and psychological control as provided by the mother and the father. We used the same items as used previously in a diary study on parenting among 8-12 year-old children (Van der Kaap-Deeder et al., in press). More specifically, four items of the Autonomy Support Scale of the Perceptions of Parents Scale (POPS; Grolnick et al., 1991) and four items from the Psychological Control Scale – Youth Self-Report (PCS – YSR; Barber, 1996) were employed. These items were slightly adapted to assess daily (rather than general) autonomy support (e.g., "Today, whenever possible, my mother/father allowed me to choose what to do") and psychological control ("Today, my mother/father was less friendly with me if I did not see things her/his way").

Plan of Analyses

As the data were hierarchically structured, with 7 measurement times (i.e., Level 1) nested within 206 family members consisting of mothers, fathers, and children (i.e., Level 2), which were nested within 206 families (i.e., Level 3), substantial dependencies within families and within persons were expected. Therefore, we employed multilevel analyses for our main models, which were performed with the statistical software package MLwiN 2.16 (Rasbash, Steele, Browne, & Goldstein, 2009). To facilitate convergence and interpretation of the models, all predictor variables at the day-level were centered around their group mean. There were 7.48% missing values in the dataset. These missing values were treated as structurally missing (i.e., listwise deletion) by default in MLwiN. In each of the main models, we started with a random intercepts-only model and then added fixed effects.

The random intercept-only models helped us to decompose the total variation into variation at the family-, person-, and day-level, while the fixed-effects models were used to test our hypotheses.

Results

Descriptive Statistics and Preliminary Analyses

For descriptive purposes, we computed aggregated scores for the study variables by computing the mean scores of these variables across the 7 days. Descriptive statistics and bivariate correlations among the measured variables can be found in Table 1. The means reveal that parents, on average, experienced relatively high levels of need satisfaction and psychological availability, whereas they reported rather low levels of need frustration and parental stress. Children perceived their parents overall to be moderately to high on autonomy support and rather low on psychological control. Correlational analyses showed that whereas parental need satisfaction related positively to psychological availability and child-perceived autonomy support and negatively to stress and child-perceived maternal (but not paternal) psychological control, parental need frustration showed an opposite pattern of relations. Additionally, psychological availability related positively and parental stress related negatively to child-perceived autonomy support. Further, parental stress related positively to child-perceived psychological control.

To determine whether there were significant associations between the background variables and the study variables, we conducted a MANCOVA, separately for the maternal and paternal ratings. Child's gender, parental educational level and marital status were entered as fixed factors and child's and parents' age and number of children in the family were entered as covariates in the prediction of all the study variables. Results showed that for the maternal ratings, none of the multivariate effects was significant (Wilks's λ ranging between .93 and .97; F ranging between .50 and .92; *ns*). For the paternal ratings, however, the multivariate effects of marital status (Wilks's $\lambda = .85$; $F(6,170) = 5.21$, $p < .001$),

parental education (Wilks's $\lambda = .77$; $F(24, 594) = 1.96$, $p < .01$), and the number of children (Wilks's $\lambda = .92$; $F(6,170) = 2.34$, $p < .05$) were significant. More specifically, being married (vs. cohabiting), having less children, and only having completed a secondary education (rather than a higher education) related to a higher level of need frustration and parental stress. Additionally, married (vs. cohabiting) fathers and fathers who had only completed a secondary education (rather than a higher education) were, respectively, more psychologically controlling according to the child and felt less psychologically available. Note that these differences may be driven by the unequal sample sizes of the different categories and should therefore be interpreted with caution. In the main analyses we controlled for marital status, parental education, and the number of children.

To examine the percentage of variance in each of the study variables that is due to within-person (Level 1), between-person (Level 2), or between-family (Level 3) variation, random intercept-only models were created for each of the 6 study variables. Interestingly, there were some parallels and some discrepancies with respect to the division of the proportion of variance at these three levels across the assessed constructs. With respect to all of the parent-reported constructs (i.e., need satisfaction and frustration, psychological availability, and stress), the greatest amount of variance was situated at the within-person level, varying between 49% and 67%. The smallest amount of variance (ranging between 5% and 20%) in these parent-reported constructs (except for stress) was due to between-family differences. However, with respect to child-reported parenting, the greatest amount of variance was situated at the between-family level (i.e., 60%), with the amount of variance at the within-person level being the second largest (i.e., 36% and 38%). As there were substantial variations between days, persons, and families with respect to all the study variables, a multilevel approach, which takes this hierarchical structure into account, was used in all subsequent analyses.

Primary Analyses

The Relations of Need Satisfaction and Need Frustration. To investigate whether parental need satisfaction and frustration related to the intervening (i.e., parental psychological availability and stress) and outcome (i.e., child-reported autonomy support and psychological control) variables on a day-to-day basis, we analyzed four models, each time including a different outcome, namely parental psychological availability (Model 1), parental stress (Model 2), child-reported autonomy support (Model 3a), and child-reported psychological control (Model 4a). Results of these analyses are displayed in Table 2. With respect to the intervening variables, need satisfaction related positively to parental psychological availability and negatively to parental stress, while need frustration showed an opposite pattern of relations. Regarding the outcomes, there was only a significant relation between need satisfaction and child-reported autonomy support.

The Intervening Role of Psychological Availability and Stress. Next, we investigated whether the daily relations between the parental needs and child-reported parenting could be accounted for by daily parental psychological availability and stress. Specifically, we built upon Model 3a and 4a by adding these two intervening variables to the model as predictors of either autonomy support (Model 3b) or psychological control (Model 3b). Results are again displayed in Table 2. Whereas autonomy support was predicted by parental psychological availability, psychological control was only predicted by parental stress. A summary of these main findings is presented graphically in Figure 2.

Table 2

Summary of the Model Estimates for the Three-Level Analyses of the Associations Between Need Satisfaction, Need Frustration, Psychological Availability, Stress, Autonomy Support, and Psychological Control

	PA	Stress	Child-reported autonomy support		Child-reported psychological control	
	Model 1	Model 2	Model 3a	Model 3b	Model 4a	Model 4b
Parameter	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*
Overall intercept	3.24 (.18)	0.77 (.10)	3.42 (.17)	3.41 (.17)	1.49 (.11)	1.50 (.11)
Need satisfaction	.36 (.04)**	-.17 (.02)**	.14 (.04)**	.10 (.04)**	-.05 (.03)	-.02 (.03)
Need frustration	-.30 (.05)**	.18 (.02)**	.01 (.04)	.02 (.04)	.03 (.03)	.01 (.03)
Parental PA				.07 (.02)**		-.01 (.01)
Parental stress				-.01 (.03)		.15 (.02)**
2*loglikelihood	6139.70	2708.54	5183.65	5092.08	3417.03	3339.39

Note. Outcomes of the models are (1) parental psychological availability (PA), (2) parental stress, (3) child-reported autonomy support, and (4) child-reported psychological control. Coefficients shown are unstandardized path coefficients (*B*) with standard errors (*SE*) reported between brackets. **$p < .01$.

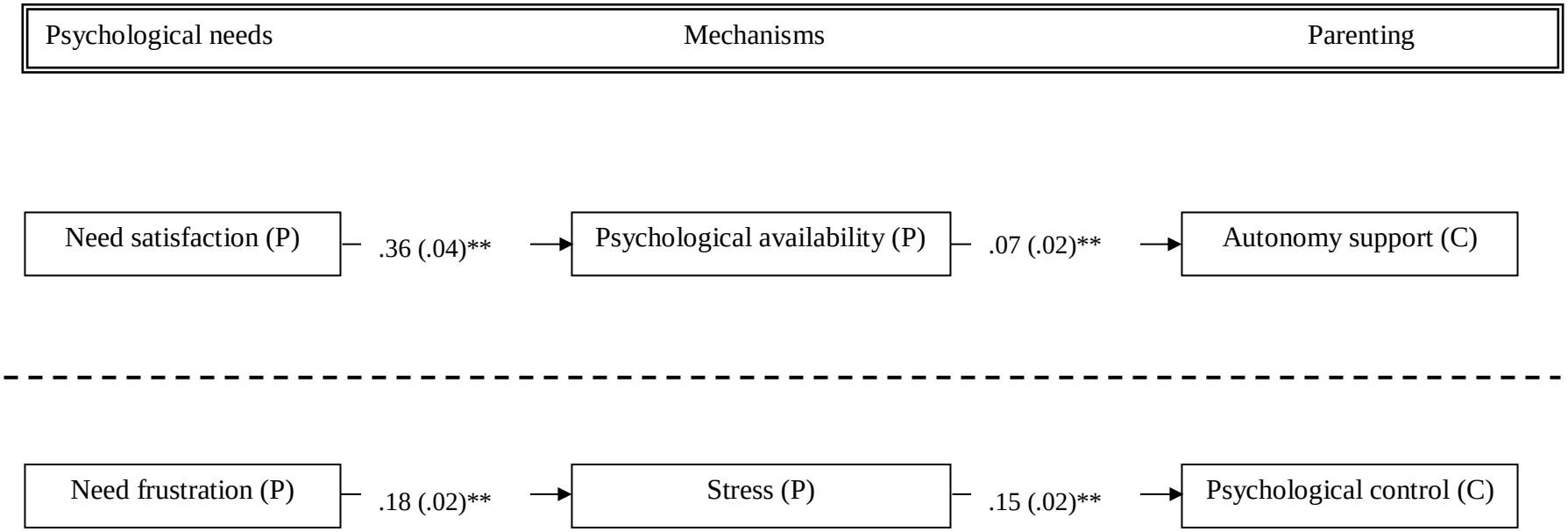

Figure 2. A Summary of the Main Findings as reported in Table 2.

Coefficients shown are unstandardized path coefficients with standard errors reported between brackets. Coefficients are based on the results of the models reported in Table 2. C = Child-report. P = Parent-report. $^{**}p < .01$.

Additionally, we investigated the significance of the indirect effect of need satisfaction on autonomy support through parental psychological availability and the indirect effect of need frustration on psychological control through parental stress. To do so, we performed the product-of-coefficient test (MacKinnon, Fairchild, & Fritz, 2007). This test determines the indirect effect by calculating the product of the a-path (i.e., the path from the independent variable to the intervening variable) and the b-path (i.e., the path from the intervening variable to the outcome controlling for the effect of the independent variable). Coefficients were taken from the previous analyses as reported in Table 2. When the 95% confidence interval (CI) of this test does not contain zero, then the indirect effect is considered significant. Both the indirect effect from parental need satisfaction to autonomy support via psychological availability (B = .026; SE = .007; 95% CI = .012-.040) as well as the indirect effect from parental need frustration to psychological control via stress (B = .028; SE = .006; 95% CI = .016-.039) was significant.

Supplementary Analyses

We performed 16 additional analyses to examine the potential moderating role of parents' gender in the relations between all predictor variables and outcomes as reported in Table 2. Of the 16 examined interactions, 14 were not significant [χ^2 (1) ranging between .00 and 3.41, all ps > .05]. Two significant interactions were found in Model 2. The first interaction (B = .21; SE = .04; p < .001) indicated that the negative relation between need satisfaction and parental stress was only significant for mothers, whereas the second interaction (B = -.17; SE = .04; p < .001) showed that although the relation between need frustration and parental stress was negative for both mothers and fathers, it was stronger for mothers than fathers.

Discussion

A family environment in which children are encouraged by parents to experience true ownership regarding their thoughts, feelings, and behaviors (i.e., autonomy support) and are not pressured to think, feel, and act in certain ways (e.g., via psychological control) is fundamental for the optimal psychological development of children (Deci & Ryan, 2000; Grolnick et al., 1991). Rather than being static constructs, these parenting behaviors have been found to vary substantially across days (e.g., Aunola et al., 2013), with this variation being at least partly due to daily fluctuations in parental need experiences (Mabbe et al., 2016a). However, the mechanisms behind these daily relations are not well understood. Therefore, we addressed the potential intervening role of parental psychological availability and stress in these relations.

The Bright and Dark Pathways of Parenting Behaviors

As hypothesized and in line with the postulation of a bright and dark pathway of socialization (Vansteenkiste & Ryan, 2013), we found that parental psychological availability intervened in the relation between need satisfaction and child-perceived autonomy support, whereas parental stress intervened in the relation between need frustration and child-perceived psychological control. Moreover, psychological availability did not relate to psychological control, whereas stress was unrelated to autonomy support. These findings indicate that parents who feel volitional, effective, and socially connected during the day are more emotionally and cognitively available for their child, which in turn allows them to provide choices to their child, to take their child's perspective into account, and to use inviting language (i.e., autonomy support). In contrast, parents who feel frustrated in their needs experience a higher level of stress which probably leads them to be more self-focused and to impose their own agenda onto the child. Note, however, that although there was a direct relation between parents' need satisfaction and child-perceived autonomy support, we did not find a direct relation between parents' need frustration and child-perceived psychological control. Thus, it seems that parental need frustration and psychological control (as perceived by the child) are only indirectly

related, with parents' stress serving as an intervening variable. As this was the first diary study to examine this relation with a multi-informant approach, future research needs to replicate this finding.

Overall, we found that the hypothesized relations between need-based experiences, the intervening variables (i.e., parental psychological availability and stress), and parenting were similar for mothers and fathers. This indicates that need-based experiences are relevant to the parenting behaviors of both parents. However, we did find that mothers are more affected by their need experiences in terms of their experienced stress. Thus, whereas maternal stress may, at least partially, arise from mothers' need frustration and may be lower in response to mothers' need satisfaction, paternal stress seems to be less strongly related to fathers' need experiences.

Although future research is needed to clarify this finding, we propose two possible explanations. First, fathers' perceived daily stress might originate more from other sources (e.g., child or environmental characteristics) than their own need experiences. For example, Darling, Senatore, and Strachan (2012) showed that fathers of children with disabilities experienced more parental stress than fathers of children without disabilities. Future research, however, is needed to directly examine the unique contributions of different sources of paternal stress. Second, mothers typically tend to be more strongly involved in parenting and spend more time raising children. Because of their stronger investment in parenting, maternal need-based experiences may be rooted more in parent-child interaction, which helps to explain their stronger link with parental stress and availability.

Limitations and Directions for Future Research

This study had several limitations. First, we included only one child per family, thereby excluding other possible children. As parents' behavior can differ between siblings (e.g., Jenkins & Rasbash, 2003), the inclusion of all family members in future research is recommended. Also, our sample was rather restricted in terms of socio-demographic characteristics as all children were aged between 8 and 12 and the majority of parents were married and had completed higher education. Thus,

our homogeneous sample limits the generalizability of the current findings (Bornstein, Jager, & Putnick, 2013) and research within more diverse samples is needed.

Second, although we employed a multi-informant approach, we only made use of questionnaires which have well-known disadvantages (e.g., lack of detail; Kelley, Clark, Brown, & Sitzia, 2003). Future research could employ other more objective techniques, such as observations, to assess parenting behaviors. Also, as we cannot be entirely confident that the parents and children filled out the questionnaires at the requested time (i.e., in the evening instead of, for example, the next morning), future studies could employ electronic diaries. Moreover, experimental designs could shed further light on the proposed causal link between the study variables. For example, future studies could experimentally induce feelings of either need satisfaction or need frustration among parents (e.g., Weinstein, Khabbaz, & Legate, 2016), subsequently examine parents' self-reported psychological availability and stress, and observe the interaction between parents and their child (as to code the degree of provided autonomy support and psychological control).

Third, other social figures, apart from parents, have also been shown to play an important role in children's well-being (e.g., friends; Ratelle, Simard, & Guay, 2013). For example, previous studies have demonstrated a relation between the need-based experiences and provided autonomy support and psychological control among coaches (Stebbings, Taylor, Spray, & Ntoumanis, 2012). It is recommended that future studies focus on the antecedent role of need-based experiences, psychological availability, and stress in the degree of provided autonomy support and psychological control among other key socialization figures. Moreover, as we only found a relation between parental psychological availability and autonomy support (and not psychological control), it would be interesting for future studies to include an indicator of the negative equivalent of psychological availability so as to examine its relation with psychological control. As previous research has found the 'acting with awareness' dimension of mindfulness (conceptually related to psychological availability) to be negatively related

with dissociation and absent-mindedness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), these indicators could be integrated in future research.

Conclusion

These findings point to (a) the importance of parents' psychological availability and stress in the daily relation between need experiences and provided autonomy support and psychological control towards their elementary school-aged child; (b) the relevance of investigating daily processes of parenting and its sources; and (c) the differentiation between a bright (i.e., need satisfaction – psychological availability – autonomy support) and dark (i.e., need frustration – stress – psychological control) pathway in socialization.

The present findings may help to inform prevention and intervention efforts concerning parenting by showing that parents' need experiences matter. Parents can, therefore, be encouraged to seek out and invest more in need-satisfying activities (e.g., by doing more things they enjoy such as hobbies). Additionally, parents can be trained to cope more efficiently with need-frustrating experiences, for example by being more mindful (Campbell et al., 2015; Duncan et al., 2009) as to increase their awareness of these negative feelings and the effect these feelings can have on their social interactions.

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General Discussion

Table of Contents

1. General Overview of the Findings of the Dissertation

At the core of this dissertation are the psychological needs for autonomy, competence, and relatedness. These psychological needs are, within Self-Determination Theory (SDT; Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013; Vansteenkiste & Soenens, 2015), postulated as critical nutrients for individuals' sustainable motivation, growth, and well-being and this would hold true regardless of individuals' age, cultural background, and socio-economic background. Although the topic of psychological needs as proposed within SDT has received massive attention in the literature, several lacunae remain that deserve attention. More specifically, in the Introduction of this dissertation, we identified five gaps in the literature on the psychological needs, which we aimed to address throughout the presented nine empirical chapters. In what follows, these gaps are readdressed and discussed in terms of the findings obtained.

1.1. Addressing Goal 1: The Generalizability of the Effects of Psychological Need Satisfaction and Frustration

A first goal of the present dissertation was to further examine SDT's universalistic claim stating that, as the psychological needs for autonomy, competence, and relatedness are postulated to be inherent and universally beneficial, all individuals should benefit from need satisfaction and suffer from need frustration (Deci & Ryan, 2000). However, the potential moderating role of the context (i.e., being autonomy-restrictive or not) has been underexplored. Therefore, we posed the following question in Chapter 2 and Chapter 3: "Is need satisfaction positively related to motivation and well-being within autonomy-restrictive contexts?". Although research concerning this issue is scarce, there is some preliminary evidence for the beneficial role of autonomy satisfaction within an autonomy-restrictive context (Langer & Rodin, 1976). In line with this, we found in Chapter 2 that patients with an eating disorder benefited from the experience of need satisfaction during their residential treatment as shown by higher levels of self-endorsed (or autonomous) motivation. Interestingly, need satisfaction not only contributed to changes in self-endorsed motivation, but patients entering therapy with a more self-

endorsed motivation also derived greater need satisfaction from the therapy along the way. In addition, increased levels of self-endorsed motivation related to a higher increase in BMI among patients with anorexia nervosa. Chapter 3 extended these findings by showing the beneficial effects of autonomy satisfaction among a sample of prisoners. Specifically, we found that prisoners who reported higher levels of autonomy, report greater quality of life within prison. Thus, both among individuals who are likely to feel caged from within, such as patients with an eating disorder, as well as among literally imprisoned individuals, need satisfaction was found to be related to positive outcomes.

In Chapter 4 we further explored SDT's universalistic assumption by focusing on individuals' autonomy strength, which serves as a potential moderating variable at the personality instead of the contextual level. Previous research concerning the moderating role of need strength in the relation between the needs and outcomes is scarce and has produced inconsistent findings (e.g., Schüler, Sheldon, & Fröhlich, 2010; Sheldon & Schüler, 2011). Moreover, only two studies so far focused specifically on autonomy strength (Chen et al., 2015; Schüler, Sheldon, Prentice, & Halusic, 2016). Therefore, we posed the following question: "Do individuals benefit and suffer from, respectively, autonomy satisfaction and autonomy frustration regardless of interpersonal differences in the strength of this need?". We found that the contribution of autonomy satisfaction and frustration to individuals' well-being and ill-being was significant for those being high, but also for those being low on need strength. Note that, in accordance with the bright and dark pathway of the needs and correlates (Vansteenkiste & Ryan, 2013), autonomy satisfaction related especially to well-being, whereas autonomy frustration was most strongly related to ill-being. More importantly, we found in general only a modest moderating role of autonomy strength in the relations between autonomy satisfaction and frustration on the one hand, and well- and ill-being on the other, with only 25% of the tested interaction effects being significant. All significant interaction-terms were in accordance with the Motive Disposition Theory, indicating that individuals with a stronger preference for autonomy benefitted or suffered more from, respectively, need-satisfying or need-frustrating experiences (Schultheiss, 2008).

Notably, consistent with SDT, none of the effects of need satisfaction neither need frustration was cancelled out among those low in need strength (except for one interaction). In short, although autonomy strength did moderate some of the relations between the need for autonomy and outcomes, autonomy satisfaction and frustration still related to individuals' psychological functioning.

1.2. Addressing Goal 2: The Integration of Psychologically Need-satisfying and Need-frustrating Experiences

Having investigated the generalizability of the effects of need-satisfying and need-frustrating experiences, we subsequently aimed to examine how individuals integrate such need-related experiences in their sense of self and whether there are interindividual differences that relate to this integrative process. Most studies on the integration of past events focused especially on the dark side of the integrative process by (1) including only indicators of a poor integration (e.g., rumination; McLaughlin, Borkovec, & Sibrava, 2007) and (2) focusing only on the role of maladaptive personal characteristics such as depressive symptoms (Brewin, Reynolds, & Tata, 1999). As the absence of poor integration does not by definition imply the presence of adaptive integration and because it has clinical merit to examine potentially protective factors in the integrative process, we aimed to examine simultaneously this bright and dark side of integration.

In Chapter 5, we posed the following question: "Does the integration of need-related experiences relate to more positive and less negative memory-related well-being?". Hereby we included both indicators of high-quality integration as well as indicators of poor integration. Specifically, among two subsamples of late adolescents and late adults we found that whereas high-quality integration (i.e., acceptance and connection) of both need-satisfying and need-frustrating past events related to more experienced positive and less experienced negative affect when thinking back to this past event, poor integration (i.e., rumination) showed an opposite pattern of relations. Thus, in accordance with the pivotal role of the integrative process within SDT (Deci & Ryan, 2000), we

observed that this process indeed predicts the extent to which these memories come with experiences of positive and negative affect today.

In Chapter 5 and Chapter 6, we aimed to extend these findings by focusing on the role of interindividual differences in the integrative process. To get a balanced view on the integrative process, we included both potentially integration-promoting and integration-impeding characteristics. Specifically, we posed the following question: "What is the role of personal characteristics in the integration of need-related experiences?". First, in Chapter 5, we focused on the role of self-congruence (i.e., a potentially integration-promoting factor) and depressive symptoms (i.e., a potentially integration-impeding factor) in integration. We found that whereas self-congruence related to memory-related affect via a higher level of acceptance and connection, depressive symptoms related to this affect mainly by a higher level of rumination. Additionally, whereas self-congruence was found to be important for the integration of both need-satisfying and need-frustrating past events, depressive symptoms was primarily predictive of the integration of need-frustrating memories. Combining the findings concerning self-congruence and depressive symptoms, there seems to be some evidence for a dual-route model, with one route representing the bright side of the integrative process and with the other route representing the dark side (Vansteenkiste & Ryan, 2013). As elderly individuals have been found to display more autonomous functioning compared to younger individuals (Sheldon, Kasser, Houser-Marko, Jones, & Turban, 2005) and have been shown to be better capable of integrating especially negative memories, we also examined whether late adults would report a higher quality of integration of the need-frustrating memories via self-congruence. This was indeed the case. Thus, whereas self-congruence can be a protective factor in the integrative process, depressive symptoms represent an integration-impeding factor.

Whereas participants in Chapter 5 were asked to recall need-satisfying and need-frustrating experiences, we experimentally induced either a competence-satisfying or a competence-frustrating experience in Chapter 6. In this way, we were able to investigate the integrative process in a more

standardized fashion as the event itself was brought under experimental control in terms of valence and intensity. We specifically focused on the role of evaluative concerns perfectionism in this process and asked individuals to report on their integration of the need-based experience one week after their participation in the experiment. We found that individuals higher on evaluative concerns perfectionism ruminated more when confronted with failure (compared to success) and also accepted the competence-frustrating experience less. Further, individuals high on evaluative concerns perfectionism showed relatively high levels of avoidance (compared to those individuals low on this facet of perfectionism), both after the failure as well as the success experience. Thus, evaluative concerns perfectionism seems to put individuals at risk of a poorer integration of especially competence-frustrating experiences.

1.3. Addressing Goal 3: The Development and Validation of an Implicit Measure of Competence Satisfaction

Another novel aspect of the present dissertation involved the development and validation of an implicit measure of competence satisfaction. In Chapter 7, we posed the following question: "Can we develop a reliable and valid measure of implicit competence satisfaction?". Specifically, we examined across five studies the reliability and validity of a propositional variant of the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) and the Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010). We found across the studies that although both implicit measures were either unrelated or moderately related to their explicit counterpart, they were unrelated to one another. Further, especially the IAT was shown to be reliable, to display discriminant validity, and to yield meaningful but modest relations with constructs in its nomological network. Together, results provided some initial support for the usefulness of the competence satisfaction IAT as an implicit measure of the need for competence.

1.4. Addressing Goal 4: The Role of Autonomy Support and Psychological Control in the Prediction of Need-based Experiences and Adjustment

As for our fourth aim, the focus shifted to the role of the social context as a facilitator of either need satisfaction or need frustration, thereby paying particular attention to the role of contextual autonomy support (i.e., the promotion and nurturance of volitional functioning; e.g., Grolnick, Ryan, & Deci, 1991; Ryan, Deci, & Vansteenkiste, 2016) and psychological control (i.e., the pressuring of someone from within by using, for example, love withdrawal; Grolnick & Pomerantz, 2009; Soenens & Vansteenkiste, 2010). As only a few studies focused on autonomy support from healthcare providers (e.g., Zuroff, Koestner, Moskowitz, McBride, Marshall, & Bagby, 2007) and no studies to date directly examined autonomy support as provided by prison staff, we posed the following question in Chapter 2 and 3: "What is the role of autonomy support from healthcare providers and prison staff for individuals' psychological functioning?". In Chapter 2 we found that autonomy support as provided by staff members of an inpatient treatment for eating disorders contributed to changes in patients' need satisfaction and subsequent changes in self-endorsed motivation when studied in isolation. However, when we controlled for the degree of experienced fellow patients autonomy support, this association fell below significance, an issue we turn to in the next paragraph. In Chapter 3, we turned to the prison context. We found that perceived afforded choice related to higher autonomy and quality of life among prisoners.

Although we only focused on the autonomy-supportive role of two underexplored vertical relationships for our previous research question, we next examined both vertical and horizontal relationships. As autonomy support and psychological control have mostly been investigated within vertical relationships (e.g., Gagne, 2003) wherein there is a difference between authority or expertise between two individuals (Deci, La Guardia, Moller, Scheiner, & Ryan, 2006), less is known about the unique role of these constructs in both vertical and horizontal relationships. Therefore, we posed the following question in Chapters 2 and 8: "Do autonomy support and psychological control as

experienced within both vertical and horizontal relationships contribute uniquely to individuals' psychological functioning?".

In Chapter 2, we found among patients with an eating disorder that although autonomy support from both parents and fellow patients contributed uniquely to patients' need satisfaction and self-endorsed motivation, there was no such unique effect of experienced autonomy support by staff members. As staff members could still indirectly relate to patients' needs and motivation by creating a positive motivational climate in which patients adopt an autonomy-supportive approach towards each other, we also tested an additional model. Specifically, we examined whether staff members' autonomy support related to patients' need satisfaction via fellow patients' autonomy support. This was indeed what we found, indicating that staff members can create a therapeutic climate wherein patients themselves learn to adopt an autonomy-supportive attitude towards each other.

In Chapter 8, we focused on the unique role of autonomy support and psychological control within two vertical relationships (i.e., mother-child; teacher-student) and within a horizontal relationship (i.e., siblings) in elementary school-aged children's psychological functioning. To gain a dynamic perspective on the role of autonomy-supportive and psychologically controlling practices, we made use of a diary study spanning five days. We found that each of the sources of perceived autonomy support and psychological control related uniquely to changes in daily well-being and ill-being, with experienced psychological need satisfaction and frustration intervening in these relations, respectively. Thus, across both chapters we found that autonomy support and psychological matter, both in vertical and horizontal relationships.

1.5. Addressing Goal 5: The Antecedent Role of Psychological Need Satisfaction and Frustration in Autonomy Support and Psychological Control

Given the crucial role of autonomy support and psychological control in individuals' psychological functioning, a final goal of this dissertation was to examine the antecedent role of

psychological need satisfaction and frustration in the provision of autonomy support and psychological control. Within SDT, it is argued that individuals' need-satisfying experiences allow them to stay more psychologically available for others, enabling them to adopt a more autonomy-supportive approach, while need-frustrating experiences come with more stress and self-centeredness, thereby increasing the odds of relating to others in a more pressuring way. Although previous studies found a relation between need-based experiences and provided autonomy support and psychological control outside the parenting context (e.g., coaches: Stebbings, Taylor, Spray, & Ntoumanis, 2012), no study thus far examined these relations directly among parents and looked into possible mechanisms of these relations. Therefore, we posed the following question: "Do need satisfaction and need frustration relate to provided autonomy support and psychological control and what are possible mechanisms?".

In Chapter 9, we examined the antecedent role of mothers' need satisfaction in the prediction of child-perceived maternal autonomy support among mothers and two of their elementary school-aged children. Consistent with our hypothesis, we found that mothers who experienced more need satisfaction were perceived as being more autonomy-supportive by their children. However, this relation was observed only among the younger and not older siblings. Perhaps the benefits of mothers' need satisfaction emerge more strongly among younger children because mothers are more actively involved in the activities of their younger child or because the younger child requires more care from the mother. Future research is needed to clarify this finding. Besides the link between mothers' need satisfaction and provided autonomy support, we also examined whether children's need satisfaction would enable them to be more autonomy supportive towards their sibling. Indeed, we found that children's need satisfaction related positively to sibling autonomy support, a pathway that was found among both younger and older siblings.

Chapter 10 extended Chapter 9 by (1) including both mothers and fathers, (2) examining both need satisfaction and need frustration as antecedents of provided autonomy support and also psychological control, (3) investigating possible mechanisms in these relations (i.e., psychological

availability and stress), and (4) looking into these relations at the daily level. In a diary study spanning 7 days among mothers, fathers, and one of their children, we found that parents' daily need satisfaction was related to a higher degree of child-perceived autonomy support via more psychological availability. Additionally, parents' daily need frustration was related to a higher degree of child-perceived psychological control via more experienced stress in parent-child interactions. Thus, as anticipated, to fully take the frame of reference of the child, to offer choices consistent with the child's preferences, and to provide truly meaningful rationales, parents' satisfaction of the needs for autonomy, competence, and relatedness matter. In contrast, parental behavior characterized by love withdrawal and guilt induction is fostered by parents' frustration of these needs.

2. Implications for Theory and Practice

The main goal of the dissertation was to advance knowledge about the psychological needs of autonomy, competence, and relatedness. In the following paragraphs we will discuss the implications of our findings for theory and practice.

2.1. Psychological Need Satisfaction and Need Frustration: The Bright and Dark Pathway

What Do the Current Findings Tell Us? As noted by Pawelski (2016), mainstream psychology is mostly focused on helping individuals to get less of what they dislike, whereas positive psychology focuses on people getting more of what they do like and want. He also noted, however, that the goal of positive psychology is to focus on both sides simultaneously. Research from a SDT-perspective has increasingly focused on these two sides (i.e., the bright and dark pathway), thereby relying on the psychological needs as a single underlying principle (Vansteenkiste & Ryan, 2013). That is, the bright pathway runs from need support -> need satisfaction -> well-being and growth and the dark pathway runs from need thwarting -> need frustration -> ill-being and psychopathology. Recent research has indeed shown that need satisfaction and need frustration are differentially related to antecedents and outcomes (e.g., Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani,

2011; Ng, Ntoumanis, Thøgersen-Ntoumani, Stott, & Hindle, 2013). In this dissertation, we directly examined the bright and dark pathway across several studies. In these studies we focused both on adults and children, on cross-sectional and diary designs, and both on the antecedents of need-based experiences (i.e., autonomy support and psychological control) as well as on consequences of these experiences (i.e., well-being, ill-being, psychological availability, stress, provided autonomy support, and provided psychological control). Whereas need satisfaction was most strongly correlated with beneficial antecedents (i.e., autonomy support) and outcomes (e.g., well-being), need frustration showed the strongest relation with psychological control and ill-being. Thus, the psychological needs for autonomy, competence, and relatedness are crucial for understanding both individuals' flourishing (when satisfied) as well as individuals' non-optimal functioning and psychopathology.

Implications for Future Research. Although accumulating research provides evidence for the unique effects of both the bright and dark sides concerning the psychological needs, more research is needed. Specifically, there is a need for experimental studies where both need satisfaction and need frustration are induced and indicators of both well-being and ill-being are assessed afterwards. Also, the inclusion of a control group would be informative as to see whether experiences of need satisfaction predict increases in well-being and whether experiences of need frustration predict increases in ill-being, compared to the neutral condition. Similarly, longitudinal studies could shed further light on the more natural interplay between contextual need support, need-based experiences, and outcomes and explore the possible reciprocal effects between these constructs. For instance, Jang, Kim, and Reeve (2016) showed in a longitudinal study among high-school students that teacher autonomy support related to increases in students' engagement via increases in need satisfaction, whereas teacher control related to increases in students' disengagement via increases in need frustration. Interestingly, they also found that disengagement predicted both increases in students' perceptions of teacher control and decreases in perceptions of teacher autonomy support.

Implications for Practice. The established presence of both a bright and dark side of psychological development and functioning has important practical value. That is, as the lack of psychological problems is not equivalent to the presence of adaptive psychological functioning and thriving, it is important for policy makers and for healthcare professionals to not only focus on the reduction of such problems (e.g., alcohol abuse and depression) but to also attend to the promotion and nurturance of positive functioning (e.g., prosocial behavior and gratitude). For example, individuals could be encouraged to reflect daily on the things for which they are thankful or to write letters to other individuals expressing their gratitude (Kaczmarek et al., 2015).

2.2. Autonomy Support and Psychological Control Across Diverse Relationships

What Do the Current Findings Tell Us? Whereas vertical relationships are characterized by a difference in authority (e.g., parent-child relationship; therapist-patient relationship), horizontal relationships are typified by a similar level of authority between both individuals (e.g., between friends or between patients). Across several studies we showed that autonomy support and psychological control matter both in vertical as well as in horizontal relationships, with beneficial outcomes being associated with autonomy support and detrimental outcomes being associated with psychological control.

Implications for Future Research. To compare the unique contribution of autonomy support and psychological control from both vertical and horizontal relationships to individuals' psychological functioning, we chose to rely on rather generic items for autonomy support and psychological control in our studies. As displayed in Table 1, however, autonomy support and psychological control consist of different facets. Each facet may be more or less relevant and prevalent depending on the relationship being vertical or horizontal. For instance, whereas the use of coercive and evaluative language (e.g., "If you don't help me now, I will never play with you again!") can be present in all relationships, the use of external motivators such as punishment (e.g., sending a child to his or her room when the child does

not want to do his/her daily chore) is more typical of vertical relationships (e.g., parent-child relationship). Therefore, a next step for future research is to gain more detailed insight in the manifestations of these facets in specific relationships. A situation-based or vignette questionnaire could be helpful in this regard. Such an approach would require individuals to respond to relationship-specific situations with specific responses (differing in the degree of autonomy support and psychological control) that are suited for that relationship. For the sibling-relationship, for example, siblings could be asked to respond to a situation like: "You really want to play a board game with your sibling, but he/she would like to go outside to play soccer. What would you say in this situation?". Possible responses could be: "I would ask if he/she would first like to play soccer together and afterwards the board game" (i.e., autonomy support) or "I would say that if he/she does not play the board game with me now, I will never play with him/her in the future" (i.e., psychological control). Note that such a relationship-specific approach has the advantage of gaining more insight in what facets of autonomy support or psychological control are more prevalent and relevant in each relationship, but that it is less suitable for comparing the unique effects of autonomy support and psychological control from different social sources (as we did in our studies).

Implications for Practice. The current findings show that receiving autonomy support is beneficial, regardless of the type of relationship in which this support is provided. Practice, however, is mostly focused on promoting need-supportive interactions within vertical relationships. That is, therapists or teachers are taught how to best interact with, respectively, their students or patients, while parents often seek out information concerning parenting strategies. The question arises then: "How can we promote autonomy-supportive interactions within horizontal relationships?". The answer consists of both a direct and an indirect route. With regard to the direct route, individuals can be taught or informed on how to best provide support to their peers (e.g., siblings, friends). For example, Ostrov, Godleski, Kamper-DeMarco, Blakely-McClure, and Celenza (2015) showed that the Early Childhood Friendship Project, a classroom-intervention for young children intended to reduce physical and

relational forms of both aggression and victimization, decreased bullying behavior and victimization. With respect to the indirect route, authority figures (e.g., parents) can be made more aware of their role in which their provided autonomy support gets translated into a more autonomy-supportive climate among those for whom they are responsible (e.g., siblings). Indeed, we found that mothers' autonomy support related to more provided autonomy support between siblings (via children's experienced need satisfaction). Additionally, in a clinical context, we observed that autonomy support provided by clinicians related to more perceived autonomy support from fellow patients. Thus, autonomy support within horizontal relationships can be fostered by both teaching individuals how to be supportive towards their peers and by the creation of an autonomy-supportive climate by key authority figures.

Table 1

Facets of Autonomy Support and Psychological Control

Keyword	Autonomy support	(Psychological) control
1. Motivation	Fostering inner motivational sources	Using external motivators (punishment, reward)
2. Initiative	Stimulating dialogue, participation, initiative and drive for exploration	Interrupting and suppressing attempts for dialogue, initiative and exploration
3. Rationale	Providing other-focused and meaningful rationales	Insufficiently providing rationale or providing own-focused and authority-based rationale
4. Pace of development	Patiently following the other's pace of development	Imposing own pace of development
5. Perspective	Welcoming and acknowledging different perspective	Minimalizing, repressing, or denying different perspective – heavily valuing of congruent perspective
6. Communication	Inviting and informing communication	Coercive and evaluative communication

Note. Adapted from *Vitamines voor Groei* (p. 508), by M. Vansteenkiste and B. Soenens, 2015, Uitgeverij Acco. Adapted with permission.

2.3. Parenting Behavior is not 'Carved in Stone' and Parents' Needs Matter

What Do the Current Findings Tell Us? Within this dissertation, we focused in several studies on parenting. In line with dynamic models of parenting (Dix, 1991; Holden & Miller, 1999; Repetti, Reynolds, & Sears, 2015), we found across these studies that parenting is a dynamic construct, fluctuating from day-to-day. These fluctuations were also related to fluctuations in parents' as well as children's need satisfaction and need frustration. These findings show that parenting is not 'carved in stone' and, therefore, is susceptible to change. This observation informs both theory and practice.

Implications for Future Research. First, as most studies on parenting focused on between-parent differences rather than within-parent differences (e.g., Gurland & Grolnick, 2005), less is known about what drives these observed within-parent differences. We found that parents' need satisfaction related to more provided autonomy support by parents feeling more psychologically available for their child, while parents' need frustration related to more provided psychological control by parents feeling more tense when interacting with their child. Future research could focus on experimental designs to validate the proposed causal link between these constructs. For example, future studies could experimentally induce feelings of either need satisfaction or need frustration among parents, subsequently examine parents' self-reported psychological availability and stress, and observe the interaction between parents and their child (as to code the degree of provided autonomy support and psychological control). For instance, Weinstein, Khabbaz, and Legate (2016) induced feelings of need satisfaction by asking participants to engage each day (for a week) in one or more of twelve listed need-satisfying activities. One example of such an activity was: "Today, think about something you could do, that would help you to feel connected and close to someone important to you in your life.". They also provided examples of how to achieve such a task, for example "by expressing feelings of gratitude to a beloved one". Additional research could also focus on other possible mechanisms in the relation between the needs and provided autonomy support and psychological control. For example, as

psychological availability was found to relate to provided autonomy support, dissociation and absent-mindedness (i.e., theoretical counterparts of psychological availability; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) are expected to relate to more provided psychological control.

Implications for Practice. The finding that parenting is variable also has practical implications as it suggests that autonomy-supportive parenting practices can be adapted and trained. Indeed, a few studies (Froiland, 2011; Joussemet, Mageau, & Koestner, 2014) showed that parents benefitted from a training concerning autonomy-supportive parenting practices with positive effects on their children's motivation and behavioral adjustment. Additionally, our findings show that parents' experiences of volition, effectiveness, and social connectedness matter for their parenting behaviors. Despite the importance of parents' own needs for their parenting, the majority of parenting programs focus on teaching parents specific parenting strategies (e.g., "How-to Parenting Program"; Faber & Mazlish, 1980; "Triple P-Positive Parenting Program"; Sanders, Markie-Dadds, Tully, & Bor, 2000). Thus, these programs (implicitly) assume that *knowing* how to parent results in optimal parenting. However, as increasing research points out the importance of parents' needs and feelings for parenting behavior (e.g., Aunola, Viljaranta, & Tolvanen, 2016), parenting programs could focus more on the parents' psychological functioning (in addition to teaching parenting strategies). We must note, however, that although parenting programs often do not focus explicitly on parents' personal functioning, they can contribute indirectly to parents' well-being (e.g., self-esteem; Fetsch & Gebeke, 1995). In general, our findings show that parents can be encouraged to seek out and invest more in need-satisfying activities (e.g., by doing more things they enjoy such as hobbies). Additionally, parents can be trained to cope more efficiently with need-frustrating experiences, for example by being more mindful (Campbell et al., 2015; Duncan, Coatsworth, & Greenberg, 2009) as to increase their awareness of these negative feelings and the effect these feelings can have on their social interactions. As we also found self-congruence to be beneficial with regards to the integration of need-frustrating experiences, parents

could be encouraged to regulate their behavior more on the basis of personally endorsed values, interests, and preferences (rather than on the basis of externally imposed expectations) (Weinstein, Przybylski, & Ryan, 2013).

3. Limitations and Future Research

Although several interesting findings emerged throughout the different empirical chapters in this dissertation, some general limitations need to be mentioned. We also outline a number of directions for future research.

3.1. Sampling: From Homogeneous to More Heterogeneous Representative Samples

A first limitation relates to the samples that were used in the current dissertation. Specifically, a substantial part of the reported studies employed convenience samples, where participants are selected based on their accessibility or proximity to the research. Such sampling has its well-known limitations, including restricted generalizability, insufficient power to detect subgroup differences within sociodemographic factors, and noise due to sociodemographic variation that cannot be controlled (Bornstein, Jager, & Putnick, 2013). In this dissertation, the use of convenience sampling mainly resulted in homogeneous samples with regard to nationality (most participants were Belgian), education (most participants completed or were currently enrolled in higher education), and marital status (parents who participated were mostly married).

Belgium is characterized by a rather strong emphasis on individuality and a moderately high focus on competition and success (Hofstede, 2001; Hofstede et al., 2010). Therefore, satisfaction of the needs for autonomy and competence might be more relevant for Belgian individuals than for individuals within a collectivistic culture which focuses more on relatedness (e.g., Iyengar & Lepper, 1999). However, a multitude of studies have found the effects of need satisfaction and frustration to be present in and similar across diverse cultures (e.g., Chen et al., 2015; Tay & Diener, 2011; Taylor &

Lonsdale, 2010). Although the effects of the needs have been found to be similar across diverse cultures, there could still be differences in the amount of need satisfaction and the way in which people get their needs met across cultures (Soenens, Vansteenkiste, & Van Petegem, 2015). An examination of the generalizability of the current findings across diverse cultures is, therefore, needed.

Also, with regard to the studies including parents, we focused mostly on mothers (except for Chapter 10, where we also included fathers). Several studies have shown that paternal and maternal autonomy support both foster positive psychological functioning in children and adolescents (e.g., Grolnick et al., 1991) and Mabbe, Soenens, Vansteenkiste, Van der Kaap-Deeder, and Mouratidis (2016) showed the relation between parents' need-based experiences and provided autonomy support or psychological control to be similar for mothers and fathers. However, other studies have shown that fathers and mothers may affect developmental outcomes in children differently (e.g., Guay, Ratelle, Larose, Vallerand, & Vitaro, 2013; Soenens & Vansteenkiste, 2005). Therefore, future studies on the relation between parents' needs, parenting, and child outcomes should focus on both mothers and fathers.

Although there was relatively low variability in certain sociodemographic characteristics across the studies, there were some notable exceptions in some studies. That is, in Chapter 4 we included South African individuals, in Chapter 2 and Study 11 of Chapter 7 we included eating disorder patients differing substantially with respect to their educational level, and in Chapter 3 and Study 2 of Chapter 4 we included prisoners differing substantially with regard to their educational and cultural backgrounds. Also, the average age of the included samples varied significantly with the youngest participants being 9 years old and the oldest participants being 76 years.

3.2. Measurement: From Self-report Questionnaires to Mixed Methods

In most studies we employed self-report questionnaires to assess our main constructs. Whereas questionnaires are suitable for some, more subjective, constructs (e.g., participants' own need satisfaction and frustration), these might be less suitable (on their own) for constructs that can also be assessed more objectively (e.g., autonomy support). Note, however, that it is mostly the perception and interpretation of others' behavior (e.g., autonomy-supportive behavior) that is predictive of individuals' psychological functioning (Soenens et al., 2015). Nonetheless, the sole use of questionnaires has well-known disadvantages (e.g., lack of detail; Kelley, Clark, Brown, & Sitzia, 2003). Future research could, therefore, employ other more objective or detailed techniques such as observations to assess, for example, parenting behaviors. Such an observational method enables researchers to examine the relation between perceived parenting behavior and observed parenting (and possible moderators of this discrepancy) and to reduce bias in the data for example due to participants' mood (Youngstrom, Izard, & Ackerman, 1999). Additionally, a mixed design employing both questionnaires as well as observations would reduce shared-method variance, which is characterized by an association between constructs based on a similar method of measurement (Tepper & Tepper, 1993). Finally, besides self-report questionnaires and observational methods, the inclusion of implicit measures could be helpful. Implicit measures are especially useful when people lack introspective access or the motivation to accurately report on their psychological attributes. Also, previous research has shown that implicit measures are especially valuable when predicting behavior occurring under reduced cognitive capacity (Gawronski, 2009). Therefore, it would be interesting to investigate the value of implicit measures in predicting spontaneous behaviors (i.e., behaviors executed without much executive control) or behaviors that are conducted under pressure. For instance, an implicit measure of parental autonomy support and psychological control might have its merits as parents are not always fully aware of their parenting style, are not always willing to disclose how they interact with their child, and because such

an implicit measure might be more informative (compared to self-report questionnaires) when predicting parenting under pressure (e.g., when the situation itself is stressful or when the parent is feeling tense).

3.3. Reversed Models

Across several studies within this dissertation we examined the relation from contextual autonomy support or psychological control (from prison or therapy staff, parents, teachers, and siblings) to individuals' need satisfaction, need frustration, motivation, well-being, and ill-being. However, social interactions are not unidirectional with one individual (e.g., the parent) influencing the other's (e.g., the child's) functioning, but bidirectional with both relational partners influencing each other's functioning. Future research, therefore, could focus on patients', prisoners' students', and children's characteristics that might have an effect on the degree of provided autonomy support or psychological control from the other relational partner. For example, in two of our other studies (not included in this dissertation), we showed that individuals scoring high on evaluative concerns perfectionism had a more negative interpersonal bond with the therapist (Van der Kaap-Deeder, Smets, & Boone, 2016) and had the tendency to be more psychologically controlling and less autonomy supportive towards their best friend (due to experiencing more need frustration and less need satisfaction within the friendship) (Van der Kaap-Deeder, Boone, & Brenning, 2017). Also, within the parenting context, multiple studies have shown that parenting is bidirectional with also child characteristics (e.g., temperament) influencing the parent-child relationship (Kuczynksi, 2003). Such bidirectional associations can be examined by longitudinal and experimental designs, but also by using a round robin design where each member of a group (e.g., both parents and all their children) is asked to report on all members of the group (Back & Kenny, 2010). Such a design allows one to

simultaneously address different sources of influence and to determine the reciprocal relations in families.

4. General Conclusion

The present dissertation aimed to address the antecedents, generalizability, and measurement of psychological need satisfaction and frustration. In a cumulative series of 14 studies, compromising more than 1500 participants, we (1) examined whether the beneficial or detrimental effects of, respectively, need satisfaction or need frustration would generalize to autonomy-restrictive contexts and to individuals differing in their degree of autonomy strength, (2) investigated how need-satisfying and need-frustrating experiences get integrated and addressed the role of personal characteristics herein, (3) developed and validated an implicit measure of competence satisfaction, (4) examined autonomy support and psychological control within both vertical and horizontal relationships, and (5) explored whether experiences of need satisfaction would enable individuals to adopt a more autonomy-supportive approach vis-à-vis others, while experiences of need frustration would relate to the exertion of greater control in relation to others. Our findings contribute to SDT's universality claim, to the importance of the integrative process and the role of interindividual differences herein, the value of autonomy support across diverse relationships, and the significance of individuals' own need satisfaction for their interpersonal functioning. However, we did not find convincing support for the validity and usefulness of the developed implicit measure of competence satisfaction. In general, our findings indicate the relevance of need-satisfying experiences for individuals intra- and interpersonal functioning, and the detrimental effects of need-frustrating experiences herein.

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Naar een beter begrip van de antecedenten, generaliseerbaarheid, en meting van psychologische behoeftebevrediging en -frustratie

Inleiding

Wanneer aan mensen gevraagd wordt wat ze echt nodig hebben in het leven om goed te kunnen functioneren, zouden de antwoorden vermoedelijk erg verschillend zijn. Zo zouden sommigen wellicht zeggen dat ze voedsel en water nodig hebben, anderen zouden aangeven dat ondersteunende familiebanden en vriendschappen noodzakelijk zijn, en weer anderen zouden misschien aangeven dat ze meer luxueuze bezittingen, status, en roem nodig hebben om optimaal te kunnen functioneren.

Binnen de empirische traditie van psychologie heeft het concept van behoeftes een lange geschiedenis (Deci & Ryan, 2000). Zo suggereerde de 'Drive' theorie dat individuen bepaalde aangeboren, fysiologische behoeftes hebben (bijv., behoefte aan voedsel en water), die de drijfveer vormen van hun acties (Hull, 1943) en die fundamenteel zijn voor een optimaal functioneren. Murray (1938), daarentegen, richtte zich op psychologische (bijv., de behoefte aan macht en dominantie) in plaats van fysiologische behoeftes, stelde dat deze behoeftes aangeleerd zijn en suggereerde dat terwijl het nastreven van sommige behoeftes voordelig kan zijn voor het welbevinden van sommige individuen, andere individuen zich meer focussen op en meer voordeel halen uit andere behoeftes (Deci & Ryan, 2000).

Een meer recente benadering rondom het onderzoek naar psychologische behoeftes is de Zelf-Determinatie Theorie (ZDT; Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013; Vansteenkiste & Soenens, 2015), misschien wel het hedendaags empirisch kader binnen het psychologisch landschap dat de sterkste positie inneemt met betrekking tot dit onderwerp. Gebaseerd op veelvuldig onderzoek stelde deze theorie de psychologische behoeftes aan autonomie (d.w.z., de ervaring van psychologische vrijheid en keuze), competentie (d.w.z., de ervaring van doeltreffendheid en succes), en relationele verbondenheid (d.w.z., het ervaren van hechte, wederkerige relaties) voorop als cruciale bouwstenen voor de motivatie, groei, en het welbevinden van individuen en beargumenteerde dat deze behoeftes universeel zijn ongeacht iemands leeftijd, cultuur, en sociaaleconomische achtergrond. Deze theorie en specifiek de notie van psychologische behoeftes vormen de kern van dit proefschrift.

Alhoewel er in de literatuur enorm veel aandacht is uitgegaan naar de psychologische behoeftes zoals voorgesteld binnen de ZDT, bestaan er nog verschillende lacunes die verdere empirische aandacht behoeven. Gebaseerd op de identificatie van deze lacunes in het bestaand onderzoek, formuleerden wij vijf bredere doelen die aan bod kwamen in een reeks van 14 studies waaraan meer dan 1500 proefpersonen deelnamen. Ten eerste beoogden wij te onderzoeken of de gunstige dan wel nadelige effecten van, respectievelijk, behoeftebevrediging of behoeftefrustratie kunnen veralgemeend worden naar autonomie-restrictieve contexten en naar individuen die een beperkte behoeftesterkte vertonen (d.w.z., het persoonlijk belang gehecht aan of het verlangen naar één van de behoeftes). Ten tweede, gegeven het belang van integratie (d.w.z., het proces waarbij mensen eerdere en huidige ervaringen accepteren en harmoniseren binnen hun zelf) voor het psychologisch welbevinden (Weinstein, Przybylski, & Ryan, 2013), onderzochten wij hoe behoeftebevredigende en behoeftefrustrerende ervaringen geïntegreerd worden en bekeken wij hier meer specifiek de rol van zowel integratie-bevorderende (d.w.z., zelfcongruentie) als integratie-verhinderende (d.w.z., evaluatieve zorgen perfectionisme en depressieve symptomen) persoonskenmerken. Ten derde, aangezien het meeste onderzoek rondom de psychologische behoeftes gebruik maakte van expliciete metingen (bijv., Chen et al., 2015), beoogden wij een impliciete meting van competentiebevrediging te ontwikkelen en te valideren. Voor ons vierde doel verlegden we de focus naar de rol van de sociale context als een facilitator van behoeftebevrediging, waarbij we specifiek ingingen op de rol van contextuele autonomieondersteuning (Reeve, 2009; Soenens, Deci, & Vansteenkiste, in druk). Hierbij werd zowel de autonomie-ondersteunende rol van socialisatiefiguren in meer verticale relaties (bijv., ouder-kind; therapeut-cliënt) onderzocht, alsook de autonomie-ondersteunende rol van individuen in horizontale relaties (bijv., ‘siblings’; medepatiënten). Tenslotte exploreerden we voor ons vijfde en tevens laatste doel of ervaringen van behoeftebevrediging individuen in staat zouden stellen om een meer autonomie-ondersteunende benadering aan te nemen tegenover anderen, terwijl ervaringen van behoeftefrustratie zouden relateren aan het uitoefenen van meer controle in relatie tot anderen. Om

deze vijf doelen te realiseren werd een reeks van cross-sectionele, longitudinale, dagboek-, en experimentele studies opgezet in diverse contexten (i.c., opvoeding, gevangeniswezen, psychotherapie) en populaties, variërend qua leeftijd (i.c., lagere schoolkinderen, adolescenten, universiteitsstudenten, ouders, ouderen), hierbij gebruik makend van multi-informantmetingen en zowel zelfrapportage als gedragsmaten.

Resultaten

De Generaliseerbaarheid van de Effecten van Psychologische Behoeftebevrediging en -frustratie.

en -frustratie. In verband met ons eerste doel rondom de veralgemeenbaarheid van de effecten van behoeftebevrediging en -frustratie, richtten we ons in Hoofdstuk 2 en 3 allereerst op autonomie-restrictieve contexten. In Hoofdstuk 2 vonden we dat eetstoornispatiënten voordeel haalden uit behoeftebevrediging tijdens hun residentiële behandeling, waarbij ze meer autonome motivatie om te veranderen rapporteerden. Dit toegenomen niveau van autonome motivatie relateerde aan een grotere gedragsmatige toename in BMI bij patiënten met anorexia nervosa. Hoofdstuk 3 breidde deze resultaten uit door de positieve effecten van autonomiebevrediging aan te tonen in een steekproef van gevangenen. Specifiek vonden we dat gevangenen die meer autonomie ervoeren, ook een hogere levenskwaliteit, zoals ervaren binnen de gevangenis, rapporteerden. Dus, zowel bij individuen die zich opgesloten voelen “van binnen uit” (d.w.z., eetstoornispatiënten) als bij letterlijk opgesloten individuen (“van buiten uit”) vonden we dat behoeftebevrediging gerelateerd was aan positieve uitkomsten.

In Hoofdstuk 4 bekeken we de rol van autonomiesterkte (d.w.z., de mate waarin individuen persoonlijk belang hechten aan autonomie of de mate waarin ze verlangen naar autonomie). We vonden dat, onafhankelijk van de interactie-effecten (met één uitzondering), autonomiebevrediging en autonomiefrustratie gerelateerd waren aan welbevinden en maladaptief functioneren. In overeenstemming met een “donker” en “licht” pad met betrekking tot de behoeftes en correlaten (Vansteenkiste & Ryan, 2013) vonden we dat autonomiebevrediging vooral gerelateerd was aan

welbevinden, terwijl autonomiefrustratie het sterkst gerelateerd was aan maladaptief functioneren. De modererende rol van autonomie-sterkte in deze relaties was eerder klein, waarbij slechts 25% van de geteste interactie-effecten significant was. Deze effecten waren in overeenstemming met de Motieven Dispositie Theorie, waarbij mensen met een sterkere voorkeur voor autonomie meer voordeel halen uit of nadeel ondervonden van, respectievelijk, behoeftebevredigende of behoeftefrustrerende ervaringen (Schultheiss, 2008). Deze resultaten tonen aan dat behoeftebevrediging belangrijk is, zowel voor mensen in autonomie-restrictieve contexten als voor zij die aangeven weinig waarde te hechten aan of weinig te verlangen naar bevrediging van de behoeftes.

De Integratie van Psychologisch Behoeftebevredigende en -frustrerende Ervaringen. In Hoofdstuk 5 en 6 onderzochten we de relatie tussen de integratie van behoefte-gerelateerde eerdere ervaringen en welbevinden en de relatie tussen persoonskenmerken en deze integratie. In Hoofdstuk 5 vonden we dat zelfcongruentie (d.w.z., de neiging om gedrag te reguleren op basis van eigen waardes, interesses, en voorkeuren; Weinstein et al., 2013) gerelateerd was aan herinnering-gerelateerd affect via een hoger niveau van acceptatie en verbondenheid, terwijl depressieve symptomen aan dit affect gerelateerd waren via vooral een hogere mate van ruminatie. Bijkomend toonden de resultaten aan dat, terwijl zelfcongruentie belangrijk was voor de integratie van zowel behoeftebevredigende als behoeftefrustrerende herinneringen, depressieve symptomen vooral relateerden aan de integratie van behoeftefrustrerende herinneringen. Daarnaast vonden we ook dat oudere personen (in vergelijking met adolescenten) meer in staat waren om behoeftefrustrerende ervaringen te integreren, deels omdat zij een hoger niveau van zelfcongruentie vertoonden.

In Hoofdstuk 6 werd er gebruik gemaakt van een experimentele benadering om zo de integratie van een gestandaardiseerde gebeurtenis te kunnen onderzoeken. Het voordeel hiervan was dat kenmerken van de gebeurtenis (zoals de intensiteit en de valentie) relatief gelijkaardig zouden zijn voor alle personen. We vonden dat individuen die hoger scoorden op evaluatieve zorgen perfectionisme (d.w.z., de neiging hebben om onrealistisch hoge standaarden te stellen en zich zorgen te maken over

eigen prestaties en fouten hetgeen gepaard gaat met veel zelfkritiek; Blatt, 1995; Frost, Marten, Lahart, & Rosenblate, 1990) meer rumineerden wanneer ze geconfronteerd werden met falen (i.p.v. met succes) en dat ze deze ervaring ook minder accepteerden. Echter, deze individuen vertoonden een relatief hoog niveau van vermijding (ten opzichte van individuen met een lage score op evaluatieve zorgen perfectionisme), zowel bij de faal- als bij de succes-ervaring. Deze bevindingen rondom de integratie van behoefte-gerelateerde ervaringen geven aan dat de manier waarop mensen terugkijken naar ervaringen gerelateerd aan de behoeftes aan autonomie, competentie, en verbondenheid belangrijk is voor hun gevoelens rondom deze gebeurtenissen. Tevens benadrukken de huidige bevindingen dat, om een kwaliteitsvolle integratie te verkrijgen, mensen gestimuleerd kunnen worden om hun gedrag meer te laten overeenstemmen met wat zij echt belangrijk vinden en dat sombere en zelfkritische gevoelens aangepakt dienen te worden.

De Ontwikkeling en Validering van een Impliciete Meting van Competentiebevrediging. In Hoofdstuk 7 beoogden we middels vijf studies een impliciete meting van competentiebevrediging te ontwikkelen en te valideren, waarbij we gebruik maakten van een propositionele variant van de Impliciete Associatie Test (IAT; Greenwald, McGhee, & Schwartz, 1998) en van de 'Implicit Relational Assessment Procedure' (IRAP; Barnes-Holmes, Barnes-Holmes, Stewart, & Boles, 2010). Over de studies heen vonden we niet enkel dat beide impliciete metingen ofwel niet gerelateerd ofwel matig gerelateerd waren aan hun expliciete tegenhanger, maar ook dat ze niet gerelateerd waren aan elkaar. Ook toonden de resultaten aan dat vooral de IAT betrouwbaar was, discriminante validiteit vertoonde, en betekenisvolle maar matige relaties vertoonde met constructen die inhoudelijk gerelateerd waren aan competentie. Alhoewel deze studies enige evidentie leveren voor de bruikbaarheid van een propositionele IAT voor het meten van competentie, dient er nog meer onderzoek uitgevoerd te worden.

De Rol van Autonomieondersteuning en Psychologische Controle in de Voorspelling van Behoefte-gebaseerde Ervaringen en Aanpassing. Voor ons volgende doel verlegden we de focus van

de relatie tussen de behoeftes en psychologisch functioneren naar de rol van de sociale context in het ondersteunen van deze behoeftes. Allereerst richtten we ons op de autonomie-ondersteunende rol van twee onderbelichte sociale figuren, namelijk zorgverleners en gevangenispersoneel. In Hoofdstuk 2 vonden we dat een hogere mate van ervaren autonomieondersteuning vanuit personeelsleden werkzaam bij een residentiële behandeling van eetstoornissen, bijdroeg aan toenames in behoeftebevrediging en bijgevolg autonome motivatie bij eetstoornispatiënten. Echter, wanneer we controleerden voor de mate van ervaren autonomieondersteuning vanuit medepatiënten, viel dit verband weg (zie ook verderop). In Hoofdstuk 3 richtten we ons op de gevangeniscontext. We vonden dat de mate waarin gevangenen het gevoel hadden dat ze keuze kregen (zijnde een facet van autonomieondersteuning), bijdroeg aan meer ervaren autonomie en een hogere levenskwaliteit.

Vervolgens bekeken we autonomieondersteuning zoals ervaren binnen zowel verticale als horizontale relaties. In Hoofdstuk 2 vonden we dat autonomieondersteuning vanuit zowel ouders (een verticale relatie) als medepatiënten (een horizontale relatie) bijdroeg aan behoeftebevrediging en autonome motivatie bij eetstoornispatiënten, terwijl er niet een dergelijk uniek effect was van autonomieondersteuning vanuit de personeelsleden (een verticale relatie). Aangezien persoonsleden alsnog een indirect effect zouden kunnen hebben op de behoeftes en motivatie van de patiënten door een positief motivationeel klimaat te creëren waarin patiënten elkaar op een autonomie-ondersteunende manier benaderen, hebben we nog een extra model getest. Hierbij vonden we dat autonomieondersteuning vanuit de personeelsleden positief bijdroeg aan behoeftebevrediging bij patiënten via een hogere mate van autonomieondersteuning tussen medepatiënten. Hoofdstuk 8 bouwde voort op Hoofdstuk 2 door ook te kijken naar psychologische controle (i.p.v. alleen naar autonomieondersteuning) en door te focussen op de gezins- en schoolcontext (i.p.v. een klinische context). We vonden middels een dagboekstudie dat autonomieondersteuning vanuit de moeder, leerkracht (twee verticale relaties), en de broer of zus (een horizontale relatie) positief bijdroeg aan de dagelijkse behoeftebevrediging en welbevinden bij lagere schoolkinderen. Ook relateerde

psychologische controle vanuit elk van deze bronnen aan meer behoeftefrustratie en meer maladaptief functioneren bij kinderen. Deze studies laten zien dat autonomieondersteuning belangrijk is, ongeacht het type relatie. Toekomstig onderzoek kan verder voortbouwen op deze bevindingen door in kaart te brengen welke facetten van autonomieondersteuning (bijv., keuze geven en het gebruik van uitnodigende taal) meer relevant zijn voor en prevalent zijn in welk type relatie.

Psychologische Behoeftebevrediging en -frustratie als Antecedenten van Autonomieondersteuning en Psychologische Controle. Vervolgens gingen we na of behoeftebevredigende ervaringen een positieve uitwerking zouden hebben op de mate van gegeven autonomieondersteuning. In Hoofdstuk 9 onderzochten we behoeftebevrediging bij de moeder als voorspeller van autonomieondersteuning zoals ervaren door twee van haar kinderen (lagere schoolleeftijd). We vonden dat deze behoeftebevrediging alleen bij de jongere kinderen bijdroeg aan meer ervaren autonomieondersteuning. Misschien dat de voordelen van behoeftebevrediging bij de moeder zich sterker voordoen bij de jongere kinderen, omdat moeders over het algemeen meer actief betrokken zijn bij de activiteiten van hun jonger kind of omdat het jonger kind meer zorg behoeft van de moeder. Toekomstig onderzoek is nodig om dit verder uit te klaren. Tenslotte vonden we nog dat de mate van behoeftebevrediging bij de kinderen positief gerelateerd was aan de mate van gegeven autonomieondersteuning aan de broer of zus vanuit dit kind. Deze bevinding was zowel op de jongere als op de oudere kinderen van toepassing.

In Hoofdstuk 10 gingen we verder door op de vraag naar de relatie tussen de behoeftes en geboden ondersteuning, maar nu keken we ook naar vaders, betrokken we psychologische controle en behoeftefrustratie, en maakten we gebruik van een dagboekstudie. Deze dagboekstudie werd uitgevoerd bij moeders, vaders, en één van hun kinderen (wederom lagere schoolleeftijd). We vonden dat dagelijkse ervaringen van behoeftebevrediging bij de ouders samenhingen met meer geboden autonomieondersteuning (volgens het kind) via meer psychologische beschikbaarheid. Daarnaast vonden we dat ouderlijke behoeftefrustratie gerelateerd was aan meer geboden psychologische controle

(volgens het kind) via meer ervaren stress in de ouder-kind interacties. Deze studies laten zien dat behoefte-gerelateerde ervaringen significant zijn voor de mate van autonomieondersteuning die iemand kan of wil geven aan andere belangrijke individuen. Toekomstig experimenteel en longitudinaal onderzoek is nodig om de causaliteit van de gevonden verbanden te kunnen aantonen en om de mogelijke wederkerige verbanden tussen deze constructen te kunnen onderzoeken (bijv., meer gegeven ouderlijke psychologische controle kan zorgen voor meer ervaren stress in de ouder-kind interacties).

Conclusie

Onze bevindingen tonen aan dat, in overeenstemming met ZDT's universaliteitsclaim (Deci & Ryan, 2000), de voordelige en nadelige effecten van, respectievelijk, behoeftebevrediging en behoeftefrustratie zich ook voordoen in autonomie-restrictieve contexten en bij mensen met een lager niveau van autonomiesterkte. Daarnaast toonden we de gunstige effecten aan van een kwaliteitsvolle integratie van behoefte-gerelateerde gebeurtenissen en de positieve rol van zelfcongruentie en de negatieve rol van depressieve symptomen en evaluatieve zorgen perfectionisme hierin. Ook vonden we dat autonomieondersteuning zoals ervaren in zowel verticale als horizontale relaties gunstige effecten had op het psychologische functioneren van mensen en dat behoeftebevredigende ervaringen mensen in staat stellen om zich meer autonomie-ondersteunend op te stellen. Tenslotte vonden we weinig bewijs voor het nut van een impliciete meting van behoeftebevrediging.

Data Storage Fact Sheets

% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: IJED_2014 Van der Kaap-Deeder, Vansteenkiste, Soenens, Verstuyf, Boone, & Smets (PhD dissertation: Chapter 2)

% Author: Jolene van der Kaap-Deeder

% Date: 26/02/2015

1. Contact details

==========

1a. Main researcher

- name: Jolene van der Kaap-Deeder
- address: Henri Dunantlaan 2, 9000 Ghent, Belgium
- e-mail: Jolene.Deeder@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste
- address: Henri Dunantlaan 2, 9000 Ghent, Belgium
- e-mail: Maarten.Vansteenkiste@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

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* Reference of the publication in which the datasets are reported: Van der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., Verstuyf, J., Boone, L., & Smets, J. (2014). Fostering self-endorsed motivation to change in patients with an eating disorder: The role of perceived autonomy support and psychological need satisfaction. *International Journal of Eating Disorders, 47*, 585-600.

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% Name/identifier study: 2016 Van der Kaap-Deeder, Audenaert, Vandevelde, Soenens, Van Mastrigt, Mabbe, & Vansteenkiste (PhD dissertation: Chapter 3)

% Author: Jolene van der Kaap-Deeder

% Date: 21/12/2016

1. Contact details

==========

1a. Main researcher

- name: Jolene van der Kaap-Deeder
- address: Henri Dunantlaan 2, 9000 Ghent, Belgium
- e-mail: Jolene.Deeder@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste
- address: Henri Dunantlaan 2, 9000 Ghent, Belgium
- e-mail: Maarten.Vansteenkiste@UGent.be

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% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: 2016 Van Assche, Van der Kaap-Deeder, Audenaert, De Schryver, & Vansteenkiste (PhD dissertation: Chapter 4)

% Author: Jolene van der Kaap-Deeder

% Date: 21/12/2016

1. Contact details

==========

1a. Main researchers

- name: Jolene van der Kaap-Deeder and Jasper Van Assche

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Jolene.Deeder@UGent.be/Jasper.VanAssche@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Maarten.Vansteenkiste@UGent.be

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* Reference of the publication in which the datasets are reported: Van Assche, J., Van der Kaap-Deeder, J., Audenaert, E., De Schryver, M., & Vansteenkiste, M. (2016). Are the benefits of autonomy satisfaction and the costs of autonomy frustration dependent on individuals' autonomy strength? *Manuscript submitted for publication.*

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- [ ] files(s) containing information about informed consent. Specify: ...

- [ ] a file specifying legal and ethical provisions. Specify: ...

- [ ] file(s) that describe the content of the stored files and how this content should be interpreted. Specify: ...

- [ ] other files. Specify: ...

* On which platform are these other files stored?

- [X] individual PC

- [X] research group file server

- [ ] other: ...

* Who has direct access to these other files (i.e., without intervention of another person)?

- [X] main researcher

- [X] responsible ZAP

- [X] all members of the research group

- [ ] all members of UGent

- [ ] other (specify): ...

4. Reproduction

==========

* Have the results been reproduced independently?: [ ] YES / [X] NO

* If yes, by whom (add if multiple):

  - name:

  - address:

  - affiliation:

  - e-mail:

% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: 2016 Van Assche, Van der Kaap-Deeder, Audenaert, De Schryver, & Vansteenkiste (PhD dissertation: Chapter 4)

% Author: Jolene van der Kaap-Deeder

% Date: 21/12/2016

1. Contact details

==========

1a. Main researchers

- name: Jolene van der Kaap-Deeder and Jasper Van Assche

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Jolene.Deeder@UGent.be/Jasper.VanAssche@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Maarten.Vansteenkiste@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

==========

* Reference of the publication in which the datasets are reported: Van Assche, J., Van der Kaap-Deeder, J., Audenaert, E., De Schryver, M., & Vansteenkiste, M. (2016). Are the benefits of autonomy satisfaction and the costs of autonomy frustration dependent on individuals' autonomy strength? *Manuscript submitted for publication.*

* Which datasets in that publication does this sheet apply to?: Study 2

3. Information about the files that have been stored

==========

3a. Raw data

---

* Have the raw data been stored by the main researcher? [X] YES / [ ] NO

If NO, please justify:

* On which platform are the raw data stored?

- [X] researcher PC
- [X] research group file server
- [ ] other (specify): ...

* Who has direct access to the raw data (i.e., without intervention of another person)?

- [X] main researchers
- [X] responsible ZAP
- [X] all members of the research group
- [ ] all members of UGent
- [ ] other (specify): ...

3b. Other files

---

* Which other files have been stored?

- [X] file(s) describing the transition from raw data to reported results. Specify: SPSS syntax file for transition raw data into subscales

- [X] file(s) containing processed data. Specify: SPSS file containing (1) raw data and (2) subscales

- [X] file(s) containing analyses. Specify: Syntax of SPSS concerning all main analyses.

- [ ] files(s) containing information about informed consent. Specify: ...

- [ ] a file specifying legal and ethical provisions. Specify: ...

- [ ] file(s) that describe the content of the stored files and how this content should be interpreted. Specify: ...

- [ ] other files. Specify: ...

* On which platform are these other files stored?

- [X] individual PC

- [X] research group file server

- [ ] other: ...

* Who has direct access to these other files (i.e., without intervention of another person)?

- [X] main researcher

- [X] responsible ZAP

- [X] all members of the research group

- [ ] all members of UGent

- [ ] other (specify): ...

4. Reproduction

==========

* Have the results been reproduced independently?: [ ] YES / [X] NO

* If yes, by whom (add if multiple):

  - name:

  - address:

  - affiliation:

  - e-mail:

% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: EJoP_2016 Van der Kaap-Deeder, Vansteenkiste, Van Petegem, Raes, & Soenens (PhD dissertation: Chapter 5)

% Author: Jolene van der Kaap-Deeder

% Date: 27/09/2016

1. Contact details

==========

1a. Main researcher

- name: Jolene van der Kaap-Deeder

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Jolene.Deeder@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Maarten.Vansteenkiste@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

==========

* Reference of the publication in which the datasets are reported: Van der Kaap-Deeder, J., Vansteenkiste, M., Van Petegem, S., Raes, F., & Soenens, B. (2016). On the integration of need-related autobiographical memories among late adolescents and late adults: The role of depressive symptoms and self-congruence. *European Journal of Personality.*

* Which datasets in that publication does this sheet apply to?: Main study

3. Information about the files that have been stored

==========

3a. Raw data

---

* Have the raw data been stored by the main researcher? [X] YES / [ ] NO

If NO, please justify:

* On which platform are the raw data stored?

- [X] researcher PC
- [X] research group file server
- [ ] other (specify): ...

* Who has direct access to the raw data (i.e., without intervention of another person)?

- [X] main researcher
- [X] responsible ZAP
- [X] all members of the research group
- [ ] all members of UGent
- [ ] other (specify): ...

3b. Other files

---

* Which other files have been stored?

- [X] file(s) describing the transition from raw data to reported results. Specify: SPSS syntax file for transition raw data into subscales

- [X] file(s) containing processed data. Specify: SPSS files containing (1) raw data and (2) subscales

- [X] file(s) containing analyses. Specify: MPlus files containing the main analyses.

- [ ] files(s) containing information about informed consent. Specify: ...

- [ ] a file specifying legal and ethical provisions. Specify: ...

- [ ] file(s) that describe the content of the stored files and how this content should be interpreted. Specify: ...

- [ ] other files. Specify: ...

* On which platform are these other files stored?

- [X] individual PC

- [X] research group file server

- [ ] other: ...

* Who has direct access to these other files (i.e., without intervention of another person)?

- [X] main researcher

- [X] responsible ZAP

- [X] all members of the research group

- [ ] all members of UGent

- [ ] other (specify): ...

4. Reproduction

==========

* Have the results been reproduced independently?: [ ] YES / [X] NO

* If yes, by whom (add if multiple):

  - name:

  - address:

  - affiliation:

  - e-mail:

% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: PAID_2016 Van der Kaap-Deeder, Soenens, Boone, Vandenkerckhove, Stemgée, & Vansteenkiste (PhD dissertation: Chapter 6)

% Author: Jolene van der Kaap-Deeder

% Date: 27/05/2016

1. Contact details

==========

1a. Main researcher

- name: Jolene van der Kaap-Deeder

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Jolene.Deeder@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Maarten.Vansteenkiste@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

==========

* Reference of the publication in which the datasets are reported: Van der Kaap-Deeder, J., Soenens, B., Boone, L., Vandenkerckhove, B., Stemgée, E. & Vansteenkiste, M. (2016). Evaluative concerns perfectionism and coping with failure: Effects on rumination, avoidance, and acceptance. *Personality and Individual Differences, 101,* 114-119.

* Which datasets in that publication does this sheet apply to?: Main study

3. Information about the files that have been stored

==========

3a. Raw data

---

* Have the raw data been stored by the main researcher? [X] YES / [ ] NO

If NO, please justify:

* On which platform are the raw data stored?

- [X] researcher PC
- [X] research group file server
- [ ] other (specify): ...

* Who has direct access to the raw data (i.e., without intervention of another person)?

- [X] main researcher
- [X] responsible ZAP
- [X] all members of the research group
- [ ] all members of UGent
- [ ] other (specify): ...

3b. Other files

---

* Which other files have been stored?

- [X] file(s) describing the transition from raw data to reported results. Specify: SPSS syntax file for transition raw data into subscales

- [X] file(s) containing processed data. Specify: SPSS files containing (1) raw data and (2) subscales

- [X] file(s) containing analyses. Specify: Syntax of SPSS concerning all main analyses.

- [ ] files(s) containing information about informed consent. Specify: ...

- [ ] a file specifying legal and ethical provisions. Specify: ...

- [ ] file(s) that describe the content of the stored files and how this content should be interpreted. Specify: ...

- [ ] other files. Specify: ...

* On which platform are these other files stored?

- [X] individual PC

- [X] research group file server

- [ ] other: ...

* Who has direct access to these other files (i.e., without intervention of another person)?

- [X] main researcher

- [X] responsible ZAP

- [X] all members of the research group

- [ ] all members of UGent

- [ ] other (specify): ...

4. Reproduction

==========

* Have the results been reproduced independently?: [ ] YES / [X] NO

* If yes, by whom (add if multiple):

  - name:

  - address:

  - affiliation:

  - e-mail:

% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: 2016 Van der Kaap-Deeder, De Houwer, Soenens, Hughes, & Vansteenkiste (PhD dissertation: Chapter 7)

% Author: Jolene van der Kaap-Deeder

% Date: 21/12/2016

1. Contact details

==========

1a. Main researcher

- name: Jolene van der Kaap-Deeder
- address: Henri Dunantlaan 2, 9000 Ghent, Belgium
- e-mail: Jolene.Deeder@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste
- address: Henri Dunantlaan 2, 9000 Ghent, Belgium
- e-mail: Maarten.Vansteenkiste@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

==========

* Reference of the publication in which the datasets are reported: Van der Kaap-Deeder, J., De Houwer, J., Soenens, B., Hughes, S., & Vansteenkiste, M. (2016). The development and validation of an implicit measure of competence need satisfaction. *Manuscript in preparation.*

* Which datasets in that publication does this sheet apply to?: Studies 1-5

3. Information about the files that have been stored

==========

3a. Raw data

---

* Have the raw data been stored by the main researcher? [X] YES / [ ] NO

If NO, please justify:

* On which platform are the raw data stored?

- [X] researcher PC
- [X] research group file server
- [ ] other (specify): ...

* Who has direct access to the raw data (i.e., without intervention of another person)?

- [X] main researcher
- [X] responsible ZAP
- [X] all members of the research group
- [ ] all members of UGent
- [ ] other (specify): ...

3b. Other files

---

* Which other files have been stored?

- [X] file(s) describing the transition from raw data to reported results. Specify: SPSS syntax file for transition raw data into subscales for each study.

- [X] file(s) containing processed data. Specify: SPSS files containing (1) raw data and (2) subscales for each study.

- [X] file(s) containing analyses. Specify: Syntax of SPSS concerning all main analyses for each study.

- [ ] files(s) containing information about informed consent. Specify: ...

- [ ] a file specifying legal and ethical provisions. Specify: ...

- [ ] file(s) that describe the content of the stored files and how this content should be interpreted. Specify: ...

- [ ] other files. Specify: ...

* On which platform are these other files stored?

- [X] individual PC

- [X] research group file server

- [ ] other: ...

* Who has direct access to these other files (i.e., without intervention of another person)?

- [X] main researcher

- [X] responsible ZAP

- [X] all members of the research group

- [ ] all members of UGent

- [ ] other (specify): ...

4. Reproduction

==========

* Have the results been reproduced independently?: [ ] YES / [X] NO

* If yes, by whom (add if multiple):

  - name:

  - address:

  - affiliation:

  - e-mail:

% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: DP_2016 Van der Kaap-Deeder, Vansteenkiste, Soenens, & Mabbe (PhD dissertation: Chapter 8)

% Author: Jolene van der Kaap-Deeder

% Date: 10/08/2016

1. Contact details

==========

1a. Main researcher

- name: Jolene van der Kaap-Deeder

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Jolene.Deeder@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Maarten.Vansteenkiste@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

==========

* Reference of the publication in which the datasets are reported: Van der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., & Mabbe, E. (2016). Children's daily well-being: The role of mothers', teachers', and siblings' autonomy support and psychological control. *Developmental Psychology*.

* Which datasets in that publication does this sheet apply to?: Main study

3. Information about the files that have been stored

==========

3a. Raw data

---

* Have the raw data been stored by the main researcher? [X] YES / [ ] NO

If NO, please justify:

* On which platform are the raw data stored?

- [X] researcher PC
- [X] research group file server
- [ ] other (specify): ...

* Who has direct access to the raw data (i.e., without intervention of another person)?

- [X] main researcher
- [X] responsible ZAP
- [X] all members of the research group
- [ ] all members of UGent
- [ ] other (specify): ...

3b. Other files

---

* Which other files have been stored?

- [X] file(s) describing the transition from raw data to reported results. Specify: SPSS syntax file for transition raw data into subscales
- [X] file(s) containing processed data. Specify: SPSS files containing raw data and subscales in long and wide format
- [X] file(s) containing analyses. Specify: Syntax of SPSS concerning all main analyses and Mlwin worksheets of the main models.
- [ ] files(s) containing information about informed consent. Specify: ...
- [ ] a file specifying legal and ethical provisions. Specify: ...
- [ ] file(s) that describe the content of the stored files and how this content should be interpreted. Specify: ...
- [ ] other files. Specify: ...

* On which platform are these other files stored?

- [X] individual PC
- [X] research group file server
- [ ] other: ...

* Who has direct access to these other files (i.e., without intervention of another person)?

- [X] main researcher
- [X] responsible ZAP
- [X] all members of the research group
- [ ] all members of UGent
- [ ] other (specify): ...

4. Reproduction

==========

* Have the results been reproduced independently?: [ ] YES / [X] NO

* If yes, by whom (add if multiple):

  - name:

  - address:

  - affiliation:

  - e-mail:

% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: PSPB_2015 Van der Kaap-Deeder, Vansteenkiste, Soenens, Loeys, Mabbe, & Gargurevich (PhD dissertation: Chapter 9)

% Author: Jolene van der Kaap-Deeder

% Date: 31/08/2015

1. Contact details

==========

1a. Main researcher

- name: Jolene van der Kaap-Deeder

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Jolene.Deeder@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Maarten.Vansteenkiste@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

==========

* Reference of the publication in which the datasets are reported: Van der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., Loeys, T., Mabbe, E., & Gargurevich, R. (2015). Autonomy-supportive parenting and autonomy-supportive sibling interactions: The role of mothers' and siblings' psychological need satisfaction. *Personality and Social Psychology Bulletin, 41*, 1590-1604.

* Which datasets in that publication does this sheet apply to?: Main study

3. Information about the files that have been stored

==========

3a. Raw data

---

* Have the raw data been stored by the main researcher? [X] YES / [ ] NO

If NO, please justify:

* On which platform are the raw data stored?

- [X] researcher PC
- [X] research group file server
- [ ] other (specify): ...

* Who has direct access to the raw data (i.e., without intervention of another person)?

- [X] main researcher
- [X] responsible ZAP
- [X] all members of the research group
- [ ] all members of UGent
- [ ] other (specify): ...

3b. Other files

---

* Which other files have been stored?

- [X] file(s) describing the transition from raw data to reported results. Specify: SPSS syntax file for transition raw data into subscales

- [X] file(s) containing processed data. Specify: SPSS files containing subscales

- [X] file(s) containing analyses. Specify: Syntax of R concerning all main analyses.

- [ ] files(s) containing information about informed consent. Specify: ...

- [ ] a file specifying legal and ethical provisions. Specify: ...

- [ ] file(s) that describe the content of the stored files and how this content should be interpreted. Specify: ...

- [ ] other files. Specify: ...

* On which platform are these other files stored?

- [X] individual PC

- [X] research group file server

- [ ] other: ...

* Who has direct access to these other files (i.e., without intervention of another person)?

- [X] main researcher

- [X] responsible ZAP

- [X] all members of the research group

- [ ] all members of UGent

- [ ] other (specify): ...

4. Reproduction

==========

* Have the results been reproduced independently?: [ ] YES / [X] NO

* If yes, by whom (add if multiple):

  - name:

  - address:

  - affiliation:

  - e-mail:

% Data Storage Fact Sheet (versie 7 maart 2014)

% Name/identifier study: 2016 Van der Kaap-Deeder, Soenens, Mabbe, Dieleman, Mouratidis, Campbell, & Vansteenkiste (PhD dissertation: Chapter 10)

% Author: Jolene van der Kaap-Deeder

% Date: 21/12/2016

1. Contact details

==========

1a. Main researcher

- name: Jolene van der Kaap-Deeder

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Jolene.Deeder@UGent.be

1b. Responsible Staff Member (ZAP)

- name: Maarten Vansteenkiste

- address: Henri Dunantlaan 2, 9000 Ghent, Belgium

- e-mail: Maarten.Vansteenkiste@UGent.be

If a response is not received when using the above contact details, please send an email to data-ppw@ugent.be or contact Data Management, Faculty of Psychology and Educational Sciences, Henri Dunantlaan 2, 9000 Ghent, Belgium.

2. Information about the datasets to which this sheet applies

==========

* Reference of the publication in which the datasets are reported: Van der Kaap-Deeder, J., Soenens, B., Mabbe, E., Dieleman, L., Mouratidis, A., Campbell, R., & Vansteenkiste, M. (2016). From daily need experiences to autonomy-supportive and psychologically controlling parenting via psychological availability and stress. *Manuscript submitted for publication.*

* Which datasets in that publication does this sheet apply to?: Main study

3. Information about the files that have been stored

==========

3a. Raw data

---

* Have the raw data been stored by the main researcher? [X] YES / [ ] NO

If NO, please justify:

* On which platform are the raw data stored?

- [X] researcher PC
- [X] research group file server
- [ ] other (specify): ...

* Who has direct access to the raw data (i.e., without intervention of another person)?

- [X] main researcher
- [X] responsible ZAP
- [X] all members of the research group
- [ ] all members of UGent
- [ ] other (specify): ...

3b. Other files

---

* Which other files have been stored?

- [X] file(s) describing the transition from raw data to reported results. Specify: SPSS syntax file for transition raw data into subscales and preliminary analyses

- [X] file(s) containing processed data. Specify: SPSS files containing raw data (per family member) and subscales

- [X] file(s) containing analyses. Specify: Mlwin worksheets of the main models

- [ ] files(s) containing information about informed consent. Specify: ...

- [ ] a file specifying legal and ethical provisions. Specify: ...

- [ ] file(s) that describe the content of the stored files and how this content should be interpreted. Specify: ...

- [ ] other files. Specify: ...

* On which platform are these other files stored?

- [X] individual PC

- [X] research group file server

- [ ] other: ...

* Who has direct access to these other files (i.e., without intervention of another person)?

- [X] main researcher

- [X] responsible ZAP

- [X] all members of the research group

- [ ] all members of UGent

- [ ] other (specify): ...

4. Reproduction

==========

* Have the results been reproduced independently?: [ ] YES / [X] NO

* If yes, by whom (add if multiple):

  - name:

  - address:

  - affiliation:

  - e-mail: